Fire Behavior

with Rebecca Wilson

Department of Conservation and Recreation

Division of Natural Heritage

Chesapeake bay Region land Steward and Eastern RX Fire Leader


VIRGINIA
SIC SEMPER TYRANNIS

DCR

Virginia Department of Conservation & Recreation

State Parks • Soil & Water Conservation • Natural Heritage
Chesapeake Bay Local Assistance • Land Conservation
Outdoor Recreation Planning • Dam Safety & Floodplains

Natural Heritage Program

Mission: Identify, protect & preserve Virginia's biodiversity.

Focus :Rare plants
Rare animals
Natural communities
Geological features

Natural Heritage Sections

Inventory

Information Management

Protection

Stewardship

Virginia Department of Conservation and Recreation, Division of Natural Heritage
Natural Heritage Stewardship Regions & Natural Area Preserves

NATURAL AREA PRESERVES - 60 PRESERVES 49,901 ACRES

1. The Cedars
2. Cleveland Barrens
3. Pinnacle
4. Big Spring Bog
5. Buffalo Mountain
6. Pedlar Hills
7. Poor Mountain
8. Johnsons Creek
9. Grassy Hill
10. Folly Mills Fen
11. Cowbane Wet Prairie
12. Chub Sandhill
13. Dendron Swamp
14. Cumberland Marsh
15. Blackwater Ecological Preserve
16. Antioch Pines
17. Grafton Ponds
18. Bush Mill Stream
19. Hickory Hollow
20. Hughlett Point
21. Dameron Marsh
22. New Point Comfort
23. Bethel Beach
24. Northwest River
25. North Landing River
26. Savage Neck Dunes
27. Cape Charles
28. William B. Trower Bayshore
29. Parkers Marsh
30. Wreck Island
31. Chotank Creek
32. Deep Run Ponds
33. Difficult Creek
34. Bull Run Mountains
35. False Cape
36. Goshen Pass
37. Grayson Glades
38. Parramore Island
39. Elklick Woodlands
40. Unthanks Cave
41. Mount Joy Pond
42. Red Rock Mountain
43. Cherry Orchard Bog
44. Mutton Hunk Fen
45. Clover Hollow
46. Marks and Jacks Islands
47. Chestnut Ridge
48. Magothy Bay
49. Naked Mountain
50. Chestnut Creek Wetland
51. Camp Branch Wetlands
52. Ogdens Cave
53. The Channels
54. Crow's Nest
55. Fletcher Ford
56. South Quay Sandhill
57. Cypress Bridge Swamp
58. Sweet Springs
59. Crawford's Knob
60. Mill Creek Springs

STEWARDSHIP REGIONS

- Chesapeake Bay
- Eastern Shore
- Northern Mountain
- Northern Virginia
- Southeast Virginia
- Southern Mountain
- Southwest Virginia

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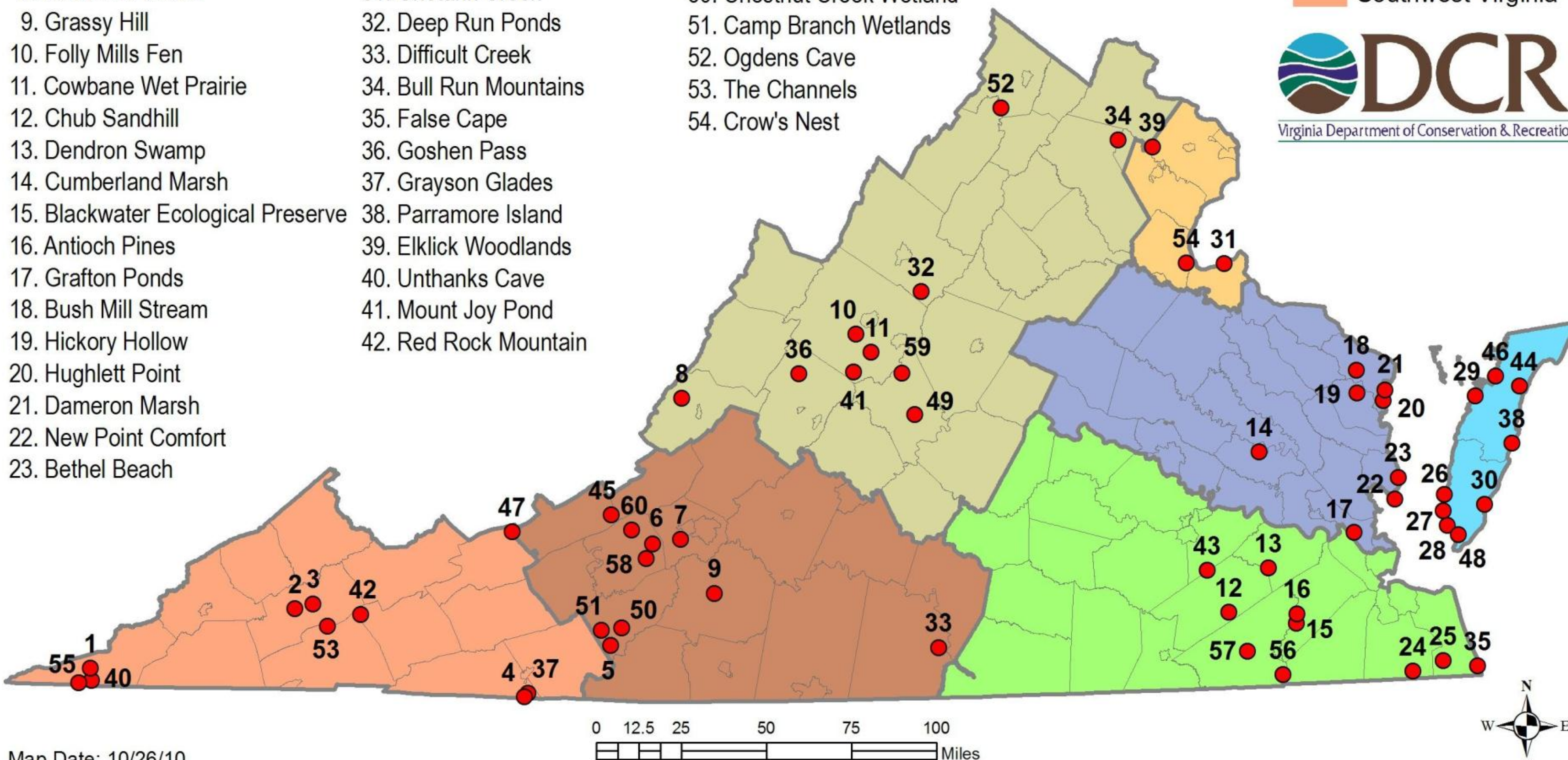


Map Date: 10/26/10

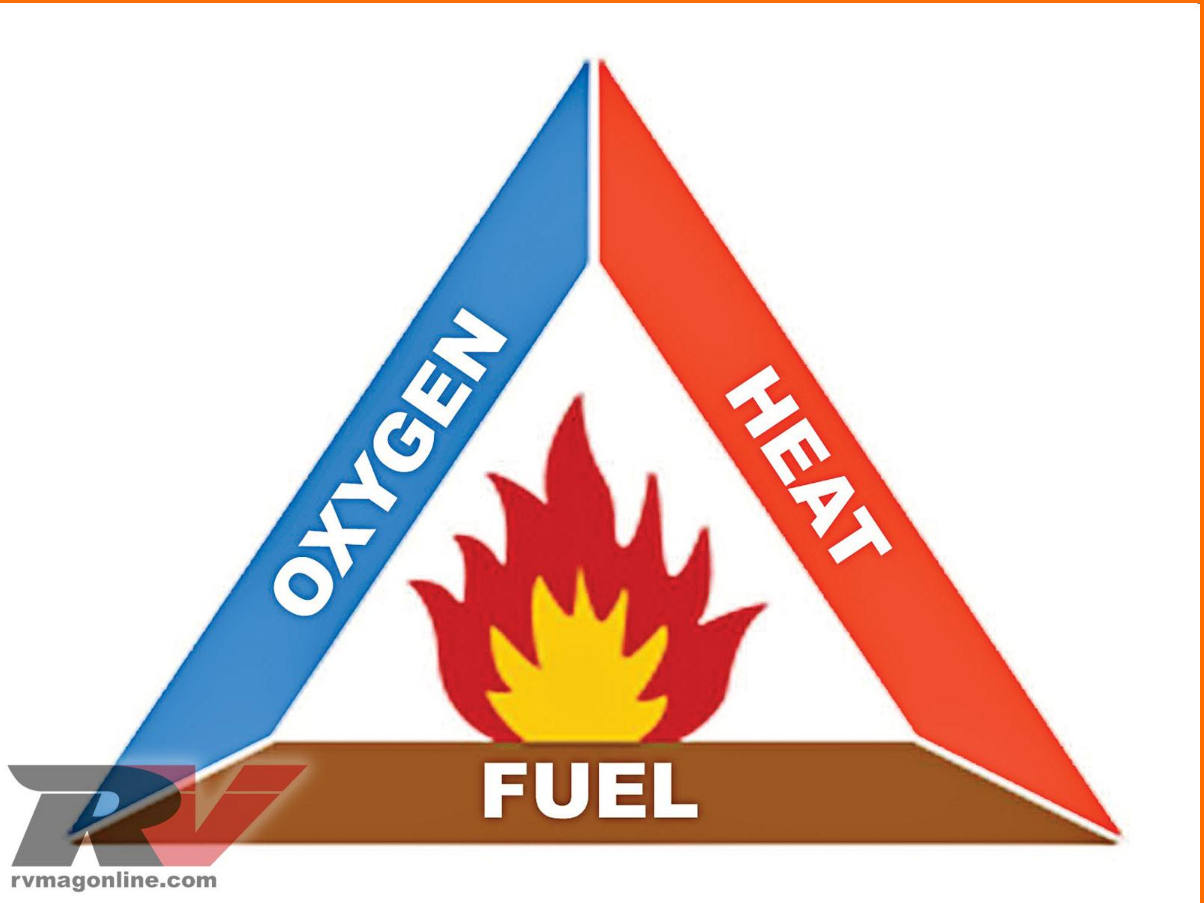
Fire Behavior - manner in which


Fuel Ignites...


Flame develops....

and fire spreads...

The Fire Triangle



All three of these elements need to be present for combustion to occur

What three elements must be present for combustion to occur?

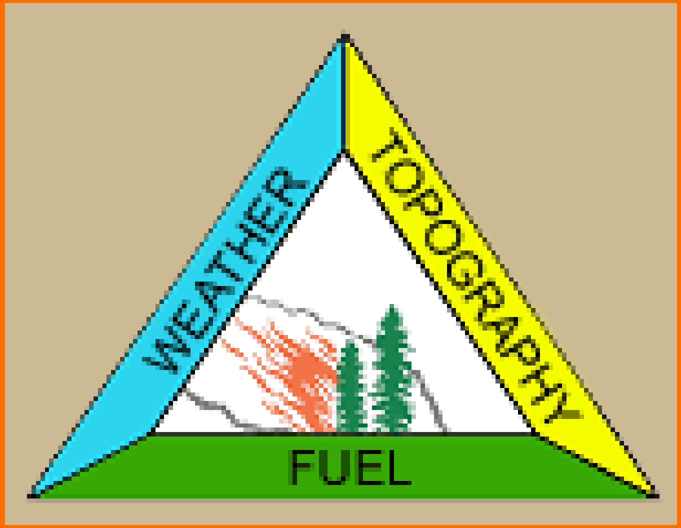
Heat

Fuel

Oxygen

Fire Behavior Triangle

What makes some fires burn hot and others not? What makes fires spread fast one day and slow on another day? A wildfire behaves according to the environment in which it is burning. This environment consists of various elements of fuels, topography and weather. These elements and their reactions with one another - and the fire itself - determine the behavior of fire.



A <u>change</u> in any one of these elements will cause a change in the behavior of the fire--and this change can be <u>very abrupt and rapid.</u>

Fuels

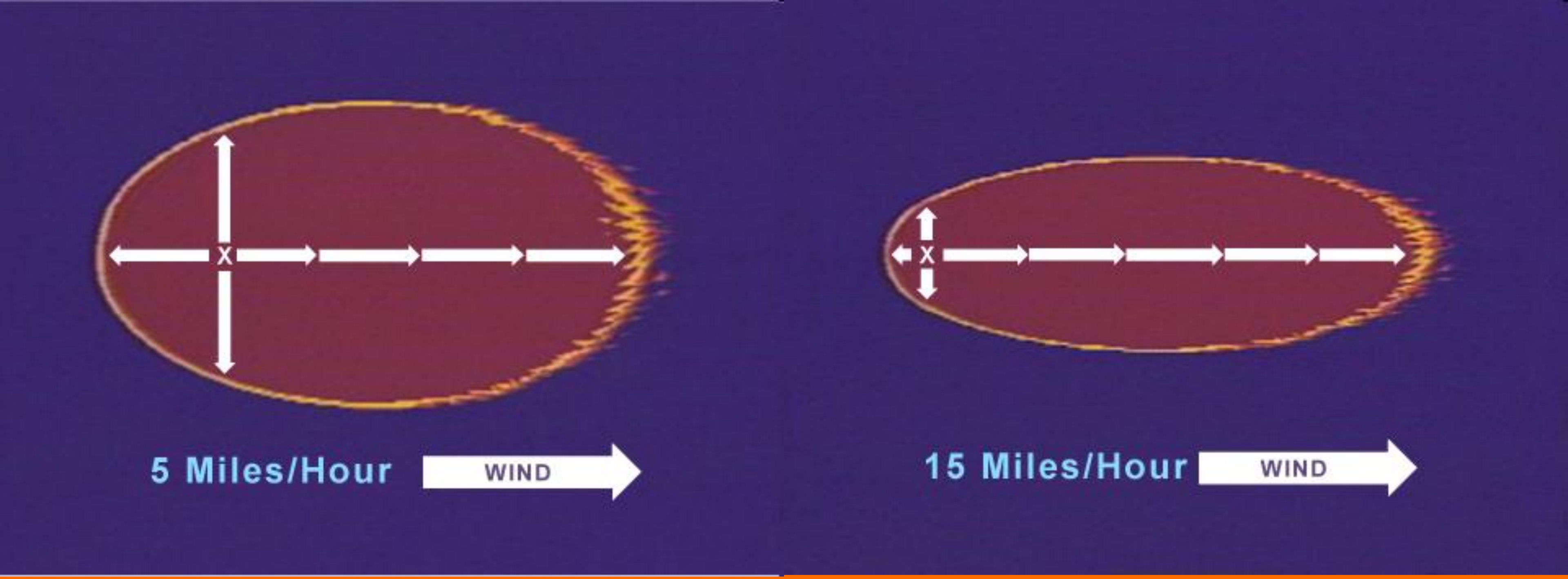
- Fuel Loading
- Available Fuels
- Size
- Arrangement
- Moisture Content
- Fuel Components

Fuel Loading

Very low volumes of fuel can result in a low intensity, creeping fire. On the other hand, large volumes of fuel could result in a blow-up fire that is difficult to control. The more fuel burning, the more heat produced. Generally, the greater the volume of fuel, the more intense the fire will be. To measure the amount of fuel, weight is used--not mass. The definition of "fuel loading" is the oven dry weight of all fuel in an area. Loading is usually expressed in tons/acre (T/A).

Available Fuel

- **Available fuel** is the amount of fuel that will burn at a given time under the situation that exists at that time. Fuel loading remains rather constant changing more on a yearly basis. On the other hand, the amount of fuel that is available to enter the burning process can change rapidly--even on an hourly basis. Many factors affect the percent of the fuel loading that is available, the major one being the amount of moisture.



Primary factors affecting the rate of spread:

Fine fuel moisture

Steepness of slope

Occurrence of spotting

Fuel loading

Windspeed

The rate of spread of a fire is most dependent on the heavier, larger fuel because those fuels contain the highest proportion of the fuel volume.

FALSE

Size

- Small fuels (called light, flashy or fast-burning) generally consist of dry grass, dead leaves, pine needles, twigs and brush. Large fuels (called heavy or slow-burning) generally consist of limbs, large stems of brush, logs and stumps.

Size of fuel influences the ease of ignition and rate of combustion

The ease of ignition and rate of combustion are most influenced by:

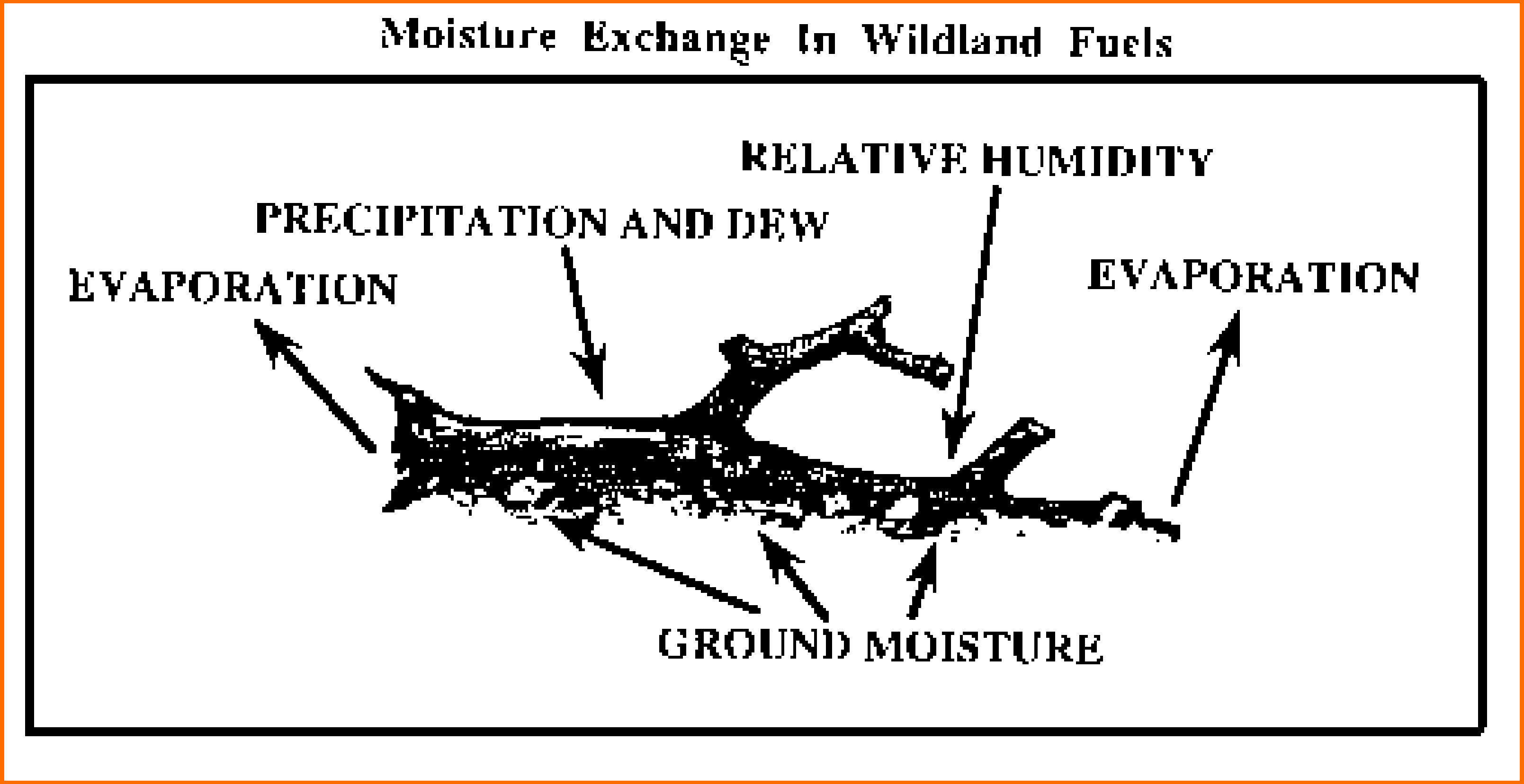
SIZE of FUEL

FUEL MOISTURE CONTENT

- The amount of moisture in fuel is the major element that will determine how much of the fuel will burn (available fuel). According to how much moisture is in the fuel, all will burn, only part will burn or, if wet enough, none will burn.

Time of day, rain, aspect and season all affect fuel moisture.

Fuel Moisture



-Fuel Moisture Content

-Fine Dead Fuels

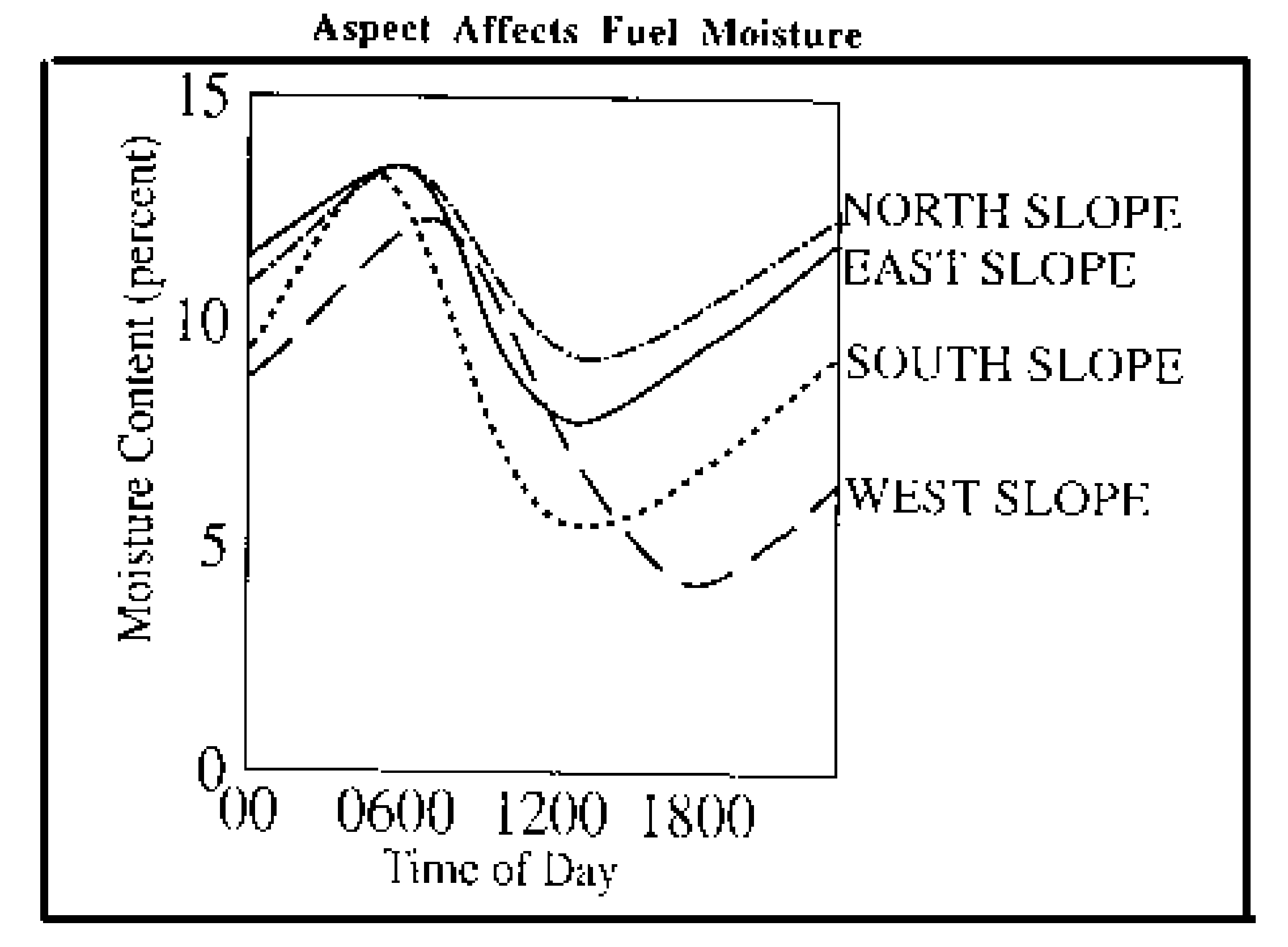
-Live to Dead Ratio

Live Fuel Moisture Content

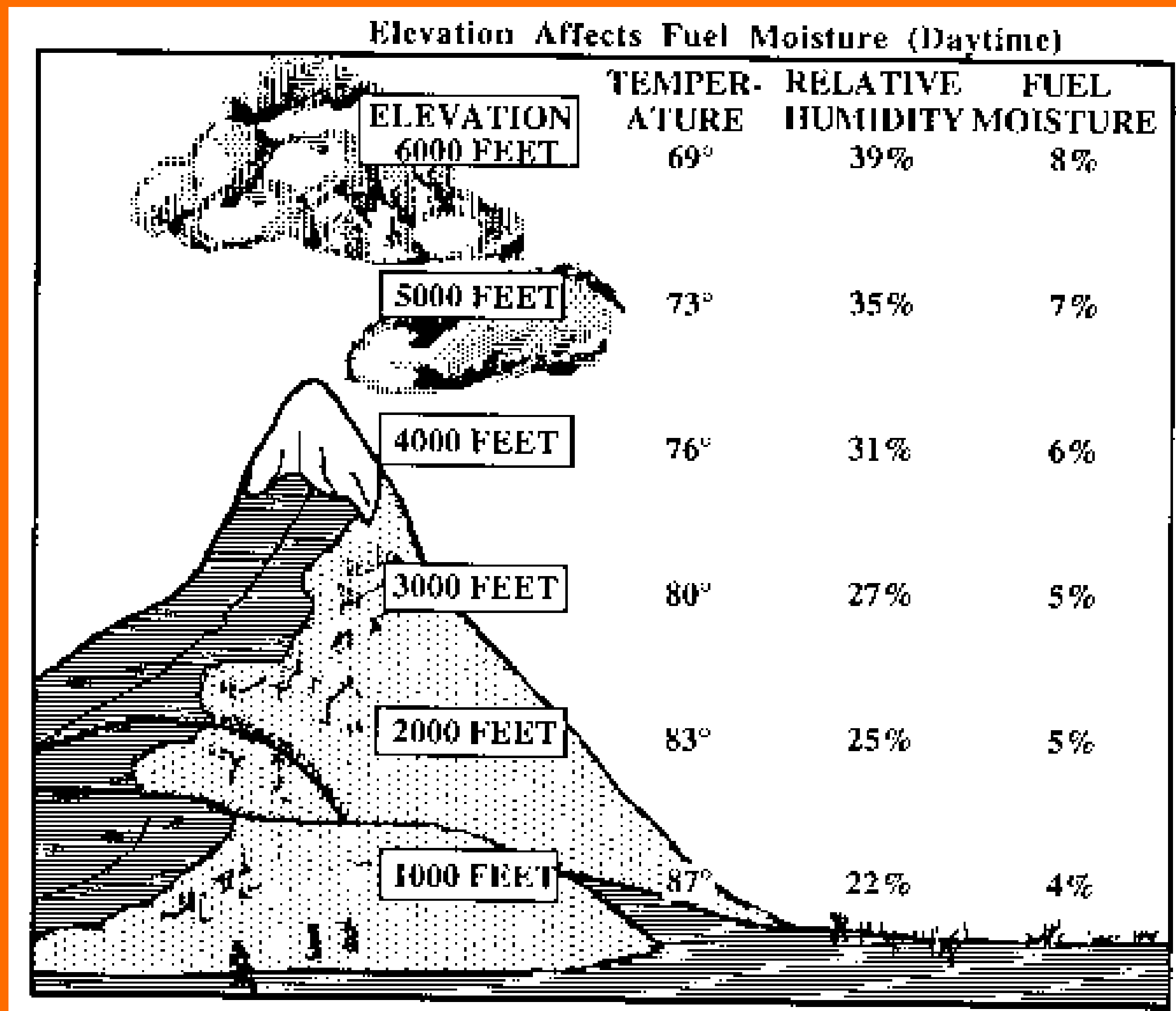
Live Fuel Moisture Content Table

Stage of vegetative development	moisture content Percent
Fresh foliage, annuals developing, early in growing cycle.	300
Maturing foliage, still developing with full turgor.	200
Mature foliage, new growth complete and comparable to older perennial foliage.	100
Entering dormancy, coloration starting, some leaves may have dropped from stem.	50
Completely cured.	Less than 30, treat as a dead fuel.

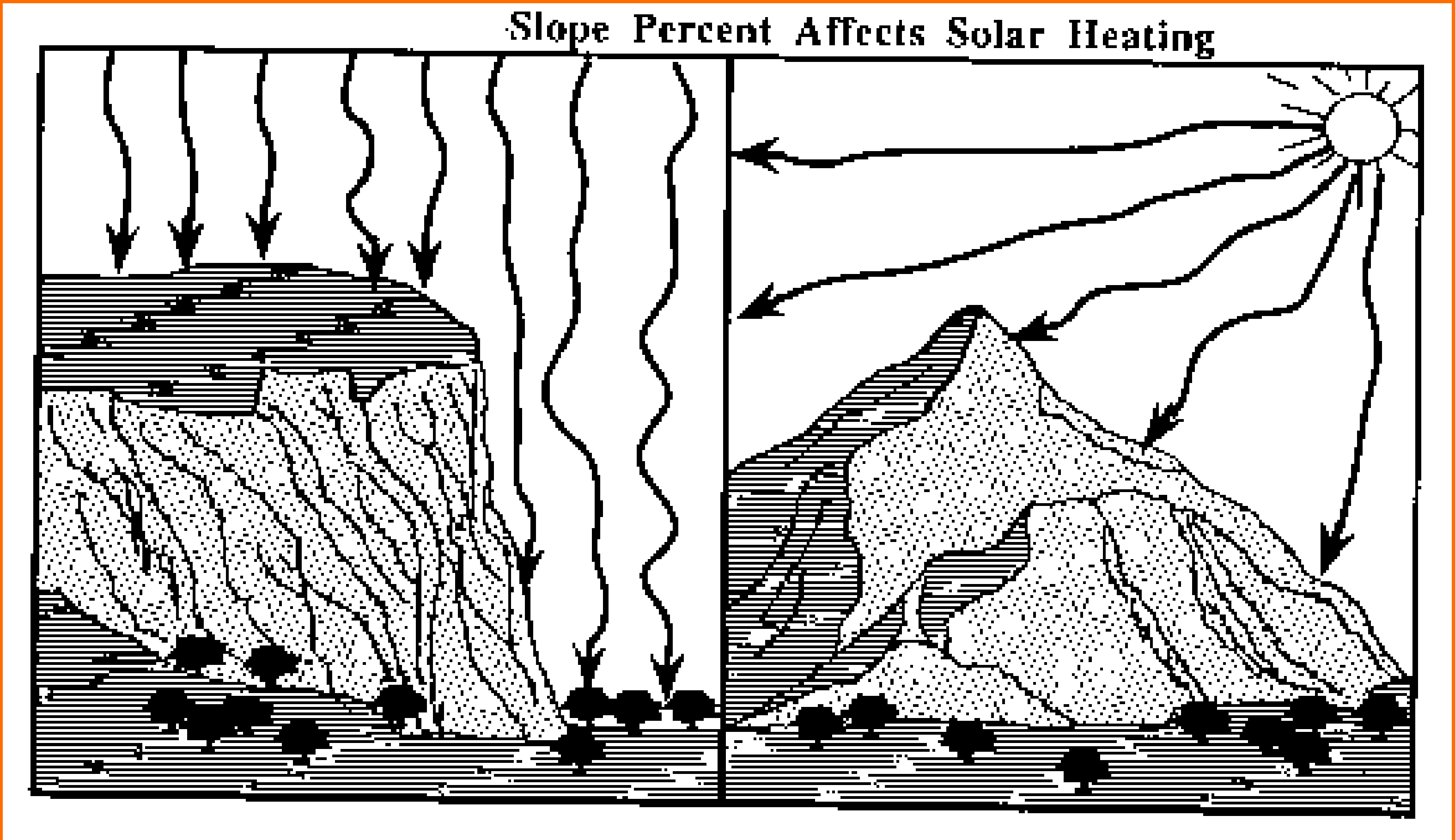
Factors Affecting Fuel Moisture
ASPECT



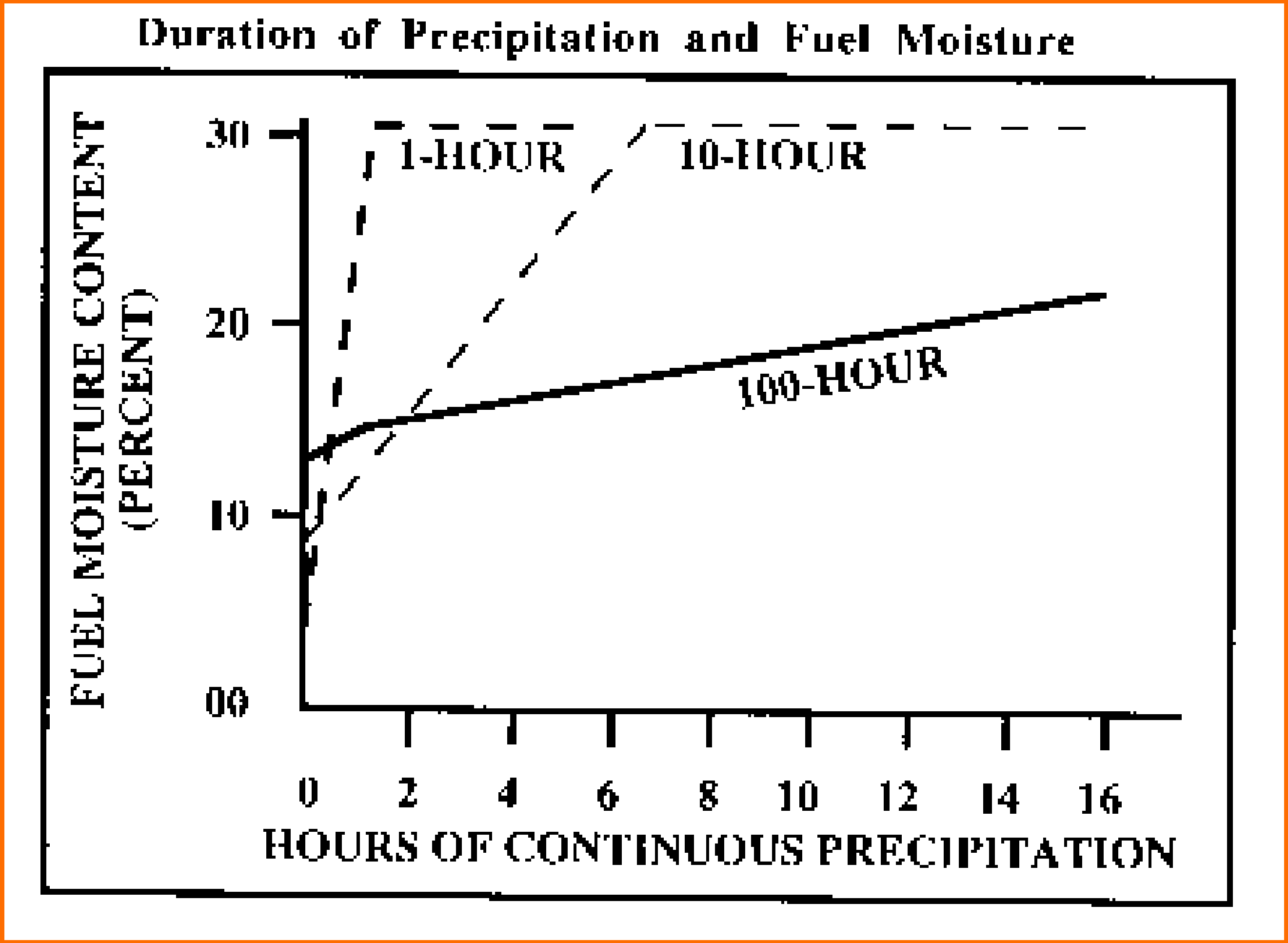
Factors Affecting Fuel Moisture
ELEVATION



Factors Affecting Fuel Moisture
SLOPE



Factors Affecting Fuel Moisture
PRECIPITATION



Which factors affect fuel moisture?

All of these :

•time of day

•rain

•aspect

•season

Fuel Moisture

- **Fine fuels** (1-hour fuel) are those fuels whose moisture content reaches equilibrium with the surrounding atmosphere within one hour. Fuels may be referred to as 1 hour, 10 hour, etc. fuels depending on their tendency to dry. Fuels 0" to 1/4" are "one-hour fuels. Fuels 1/4" to 1" are known as 10-hour fuels.

Factors Affecting Fuel Moisture
TIMELAG

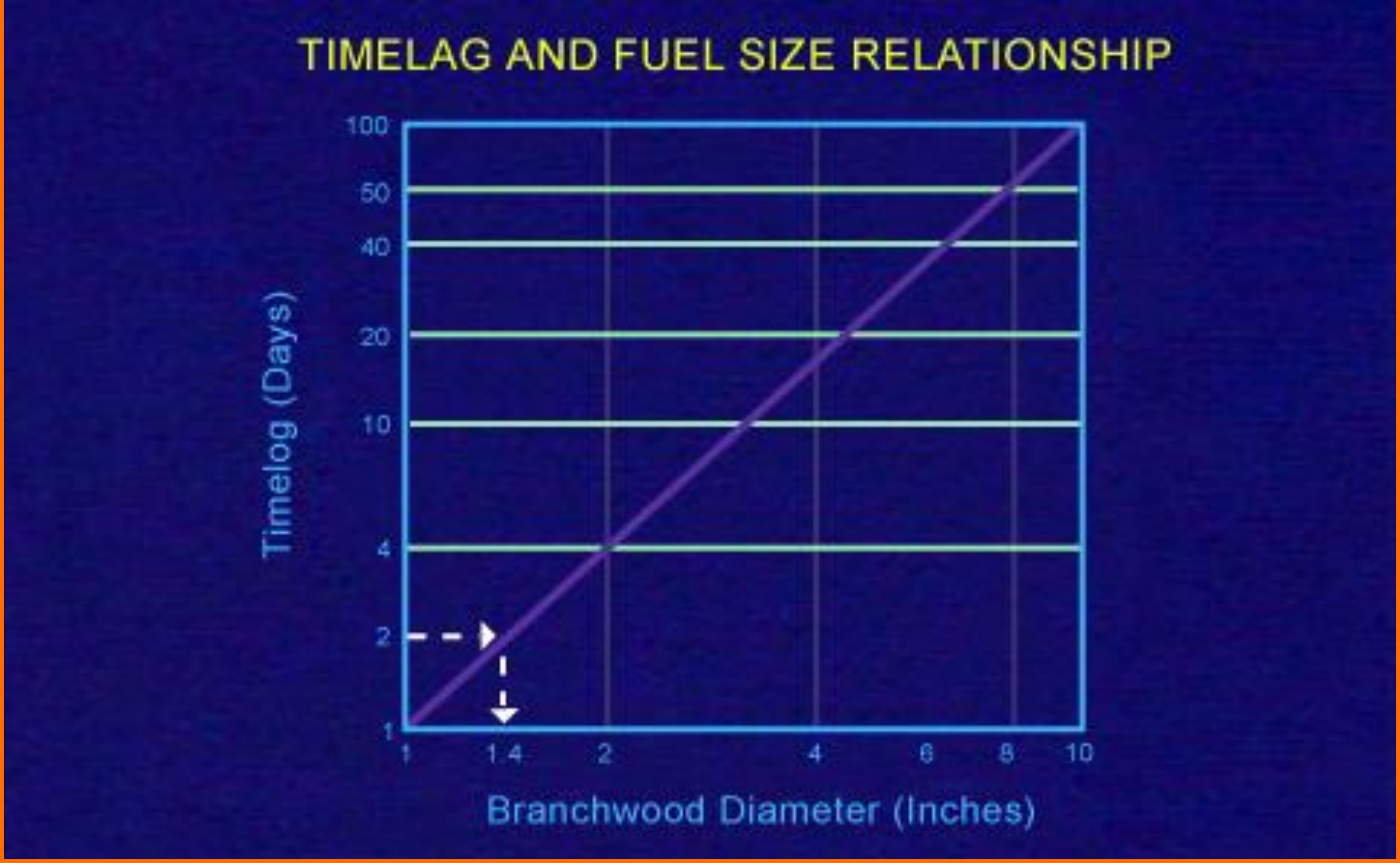
Fuel Size Timelag Categories

<1/4 inch in diameter	1 Hour Timelag Fuels
1/4 to 1 inch in diameter	10 Hour Timelag Fuels
1 to 3 inches in diameter	100 Hour Timelag Fuels
3 to 8 inches in diameter	1000 Hour Timelag Fuels

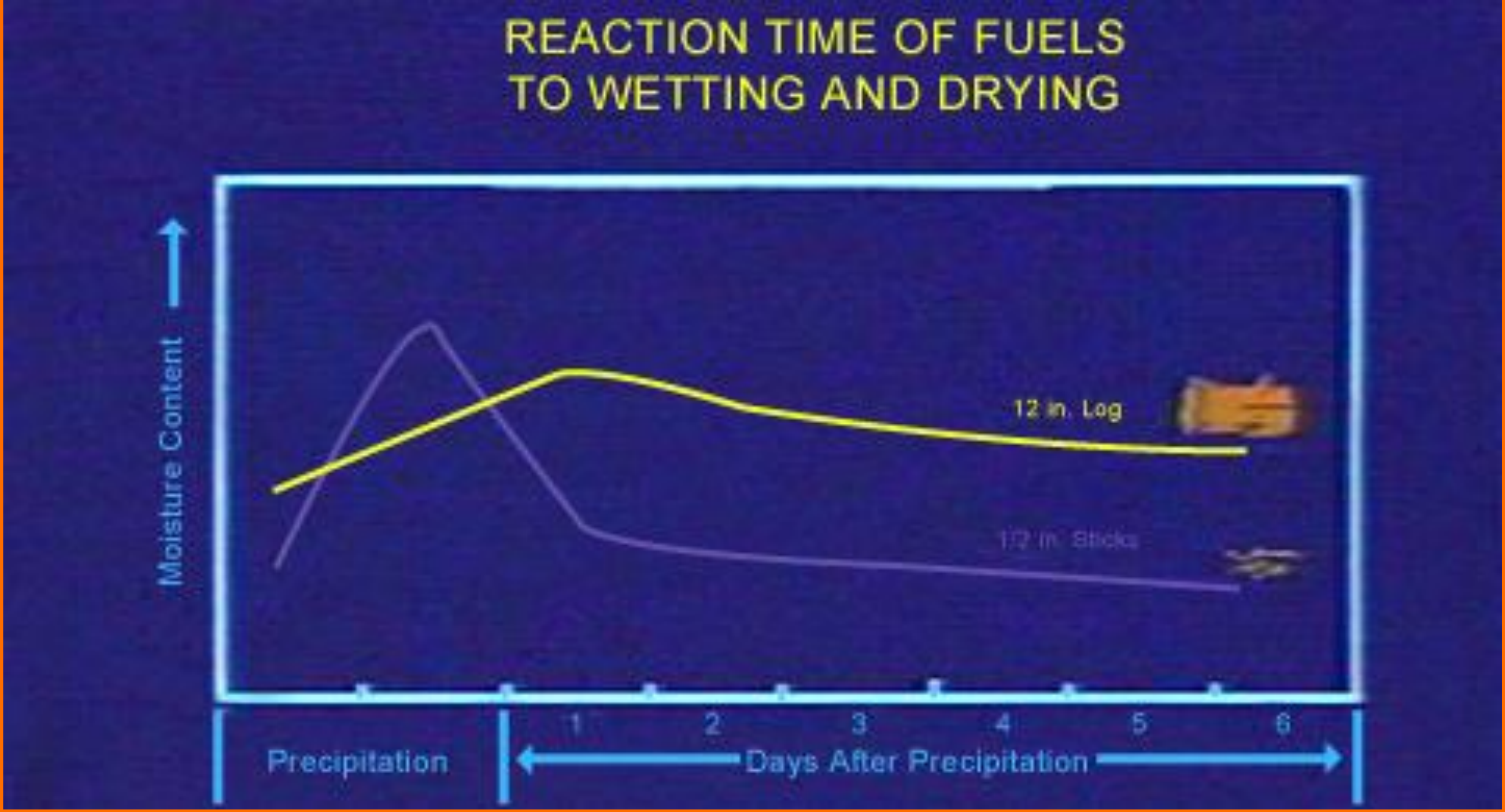
Fuel Moisture Timelag

Timelag : An indication of the rate a fuel gains or loses moisture due to changes in its environment, or the time necessary for a fuel particle to gain or lose approximately 63 percent of the difference between its initial moistture content and its equilibrium moisture content.

The time lag of fine fuels is short, and they reach their equilibrium moisture content quickly. Heavy fuels have a longer time lag. They will usually not reach an equilibrium moisture content since environmental conditions do not stay constant.



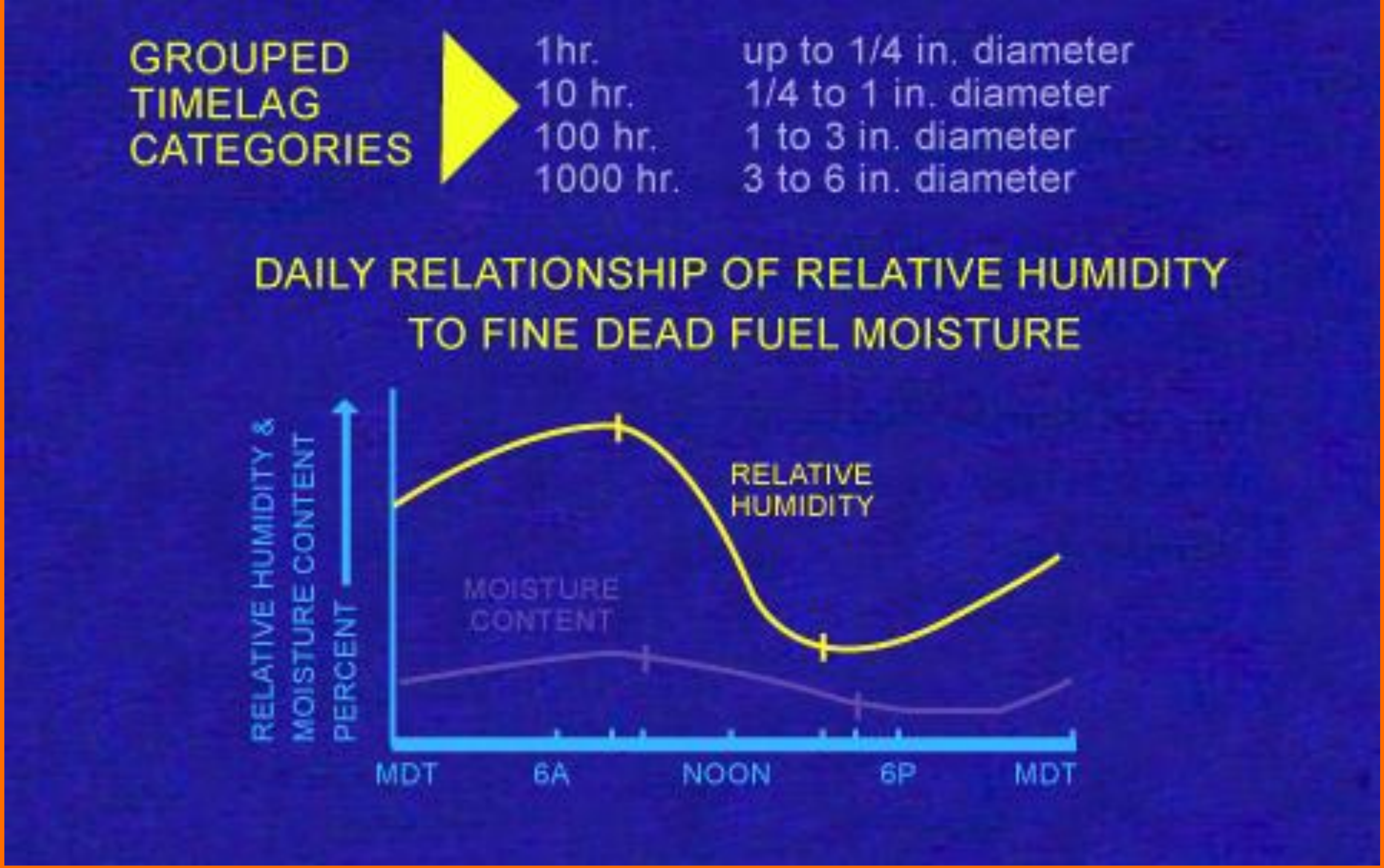
Fuels of 1.4 inches in diameter have a time lag of 48 hours or 2 days. Fuels 2 inches in diameter have a time lag of 4 days, and so on. This means that if the air was kept at a constant point drier than the fuels, it would take 4 days, time for 2-inch branchwood to lose 63 percent of the difference between its initial weight and the equilibrium moisture content.



If the fuels experience a day with precipitation, the moisture content of both will go up, but note the rates at which they absorb moisture. The 12-inch log is still gaining moisture after the rain has stopped, perhaps because of free water and wet soils resulting from the rainfall. The 1/2-inch sticks gain moisture rapidly but also lose it rapidly when temperatures and relative humidity return to normal. Light rains for long time periods of time can have more effect on the moisture content of large dead fuel than heavy rains of short duration.

Light rains for long time periods of time:

can have more effect on the moisture content of large dead fuel than heavy rains of short duration.



The figure above shows the daily relationship of relative humidity to fine, dead fuel moisture. With no major airmass changes, relative humidity typically rises during the night with lowering temperatures until it reaches the highest humidity just about sunrise. Relative humidity then usually starts to drop with rising temperature until the lowest humidity is reached during midafternoon. The fine, dead fuel moisture curve follows the relative humidity curve with a short time lag of about 1 hour.

Typically in Virginia, the relative humidity would be lowest at what time of day?

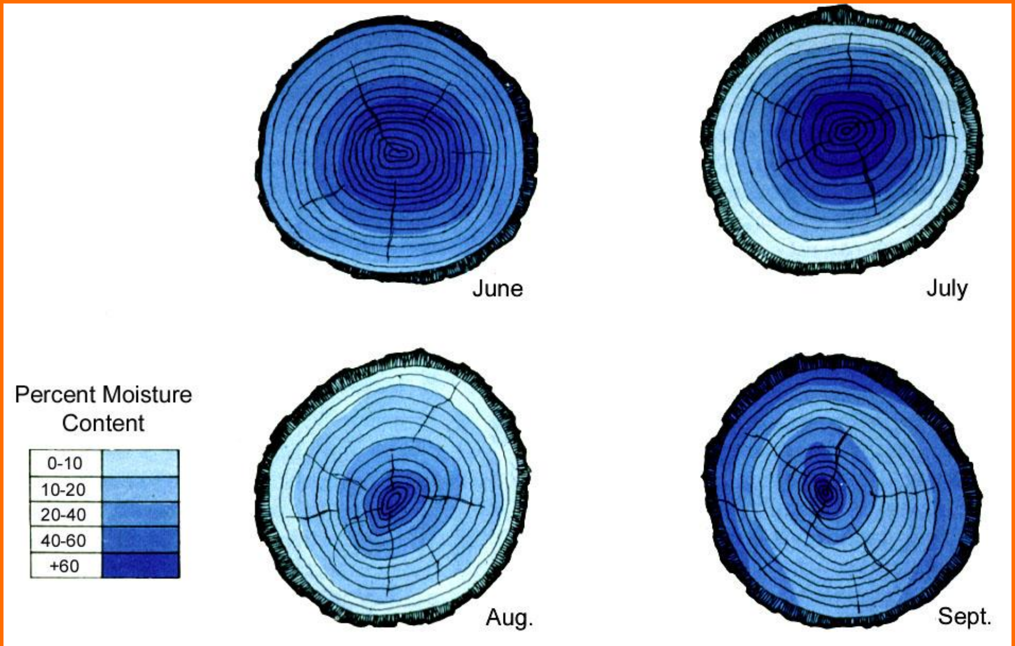
3:00 p.m.

Given that RH is at its lowest mid afternoon, moisture content of the fine dead fuels will be lowest:

Early evening

Fuel Moisture

- A large log, wet from winter precipitation dries through the summer from the outside in. In the fall, as rains begin and temperatures and humidities moderate, the process is reversed and the log begins to take on moisture from the outside in.



ARRANGEMENT

- Fuel can be arranged in different ways that will affect the behavior of the fire. Loosely arranged fuel will ignite quicker and burn more intensely because drying is quicker and also more oxygen is available among the fuel for the combustion process. As fuels are compacted, less oxygen will be available and less wind can penetrate the mass to drive off the moisture.


NATIONAL
WILDLIFE
REFUGE

April 20, 2007

« Previous Day | April | 20 | 2007 | View | Next Day »

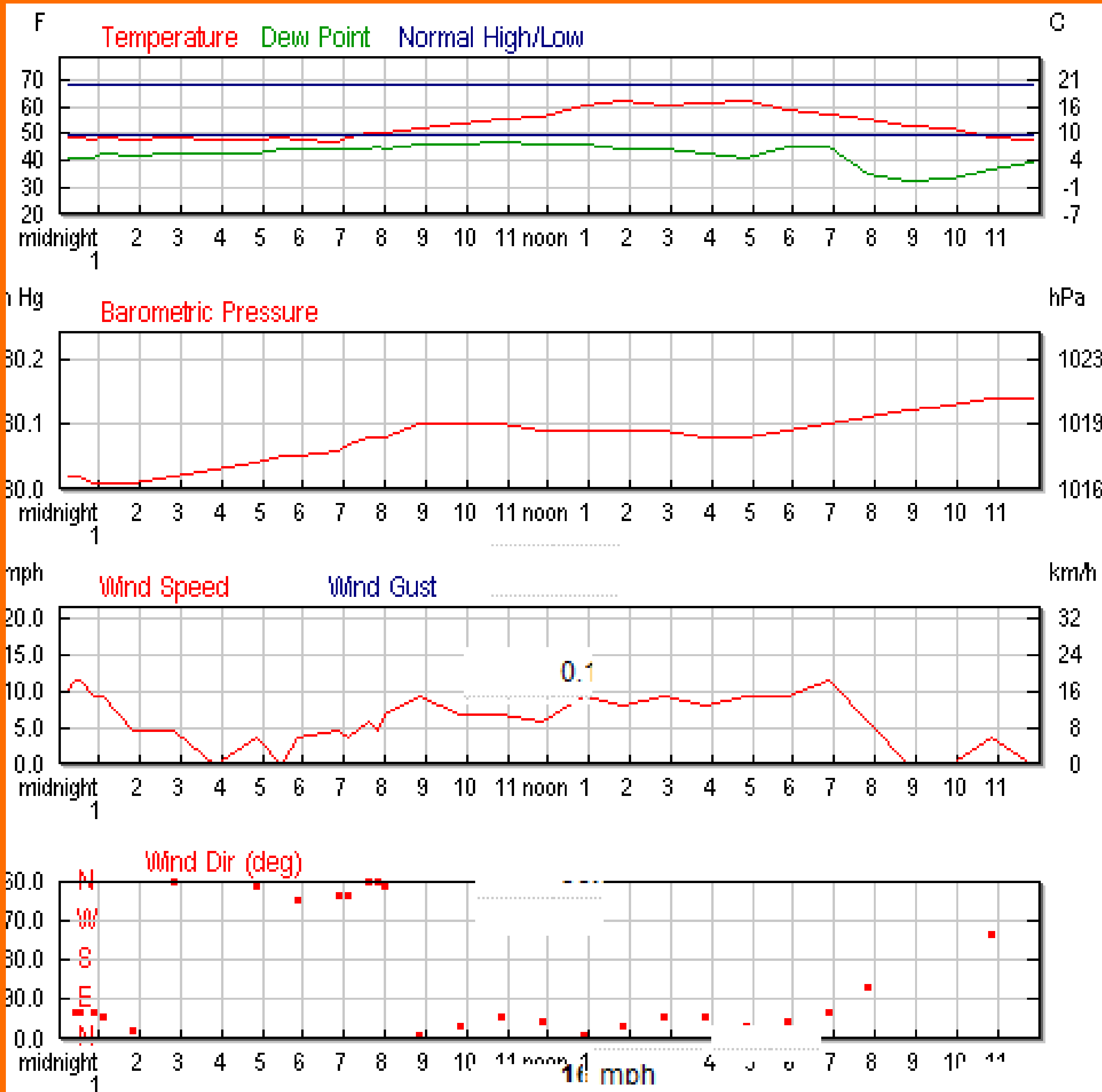
Daily | Weekly | Monthly | Custom

	Actual:	Average :	Record :
Temperature:			
Mean Temperature	54 °F	59 °F	
Max Temperature	63 °F	68 °F	91 °F (1941)
Min Temperature	45 °F	49 °F	33 °F (1926)
Degree Days:			
Heating Degree Days	11	7	
Month to date heating degree days	[redacted]	188	
Since 1 July heating degree days	3013	3239	
Cooling Degree Days	0	1	
Month to date cooling degree days	7	19	
Year to date cooling degree days	27	30	
Growing Degree Days	4 (Base 50)		
Moisture:			
Dew Point	42 °F		
Average Humidity	69		
Maximum Humidity	93		
Minimum Humidity	45		

April 20, 2007

Growing Degree Days	4 (Base 50)		
Moisture:			
Dew Point	**42** °F		
Average Humidity	69		
Maximum Humidity	93		
Minimum Humidity	45		
Precipitation:			
Precipitation	**0.00** in	**0.11** in	**5.86** in (1991)
Month to date precipitation	2.71	2.28	
Year to date precipitation	9.35	13.63	
Snow:			
Snow	**0.00** in	**0.00** in	**0.00** in (2002)
Month to date snowfall	0.1	T	
Since 1 July snowfall	0.1	7.7	
Snow Depth	**0.00** in		
Sea Level Pressure:			
Sea Level Pressure	**30.07** in		
Wind:			
Wind Speed	**5** mph (NNE)		
Max Wind Speed	**13** mph		
Max Gust Speed	**16** mph		
Visibility	**10** miles		
Events			

April 20, 2007




FIRE


Firecon
SUPERIOR
Steel Products, Inc.




Weather

- Wind
- Relative Humidity
- Precipitation
- Temperature
- Stability of the atmosphere

WIND…

- Of all the elements of weather that affect the behavior of fire, **wind is the most important--**and the most variable. Wind can change direction and intensity throughout the day. This change can be very abrupt surprising the fire fighter that is not alert. Abrupt changes generally occur during the afternoon when atmospheric conditions are most unstable.

Winds are named after the direction from which they blow. South winds come from the south.

A wind blowing from the north towards the south is a south wind?

FALSE!

More WIND…

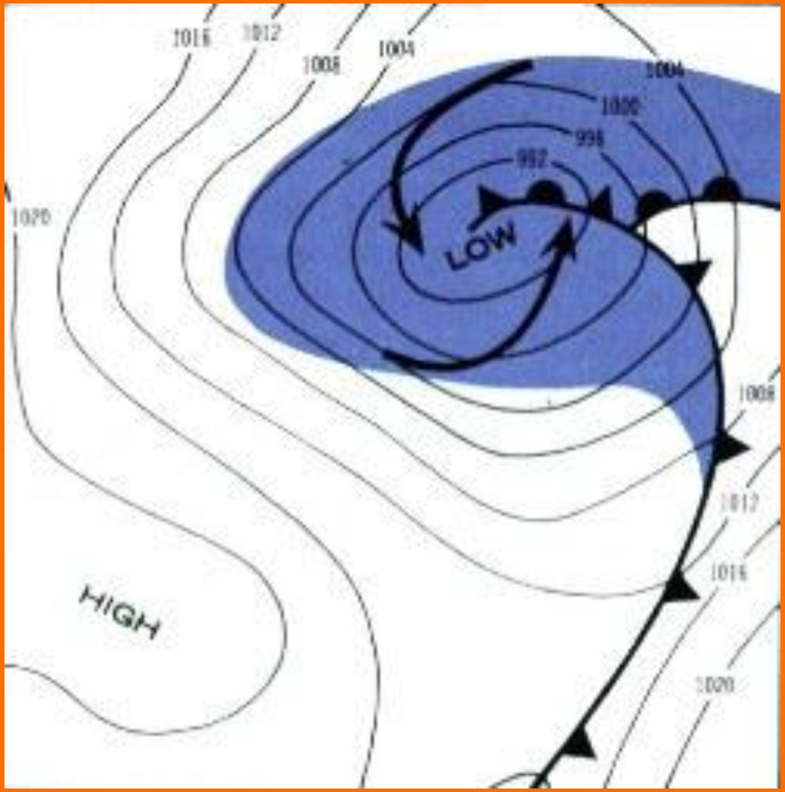
- Wind presents the most persistent problem. It can change speed, direction, or become quite gusty. Wind influences the rate of spread and intensity of the fire. High winds will cause the head of a fire to move ahead rapidly. It may cause to jump barriers that would normally stop a fire. Wind can carry sparks and firebrands ahead of the main fire causing spotting.
- Wind is the most important and most unpredictable influence on fire behavior.

One of the most important influences on fire behavior and least predictable is:

WIND

Wind – cold fronts

- **Cold fronts** usually travel in a west to easterly direction--usually to the southeast. A cold front will generally change the direction of the wind from a southerly direction to the west and on around to the northwest.

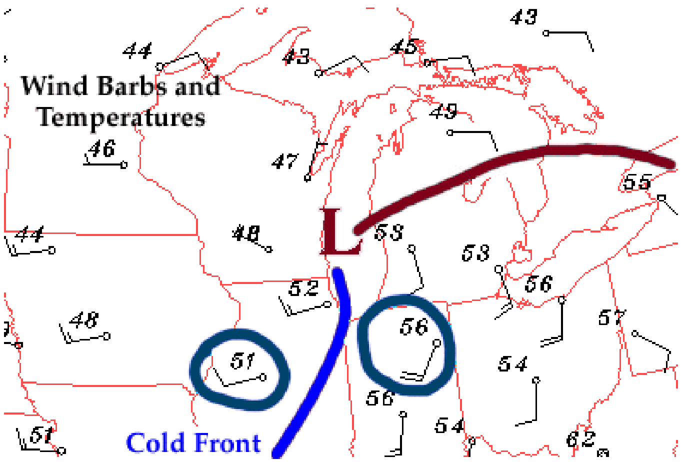


In Virginia, a Southwest wind can be expected to switch to which direction as a cold front passes?

WEST

Wind Shift Across A Cold Front

from south-southwest to west-northwest



A sudden change in wind direction is commonly observed with the passage of a cold front. Before the front arrives, winds ahead of the front (in the warmer air mass) are typically out of the south-southwest, but once the front passes through, winds usually shift around to the west-northwest (in the colder air mass).

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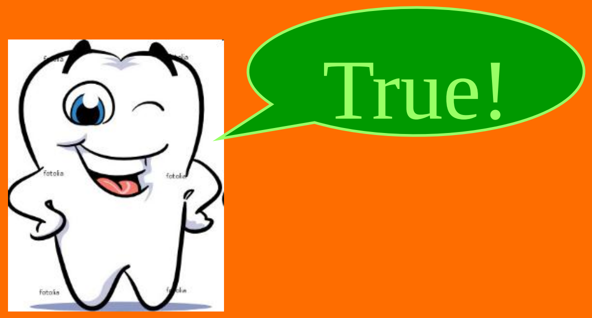
http://ww2010.atmos.uiuc.edu/%28Gh%29/wwhlpr/cold_front_winds.rxml

As a cold front passes over an area the winds will gain in intensity and shift counterclockwise



Around a low pressure system, air flows in a ____________ manner?

COUNTER CLOCKWISE

Relative Humidity

- Relative humidity is the term used to express the amount of moisture in the atmosphere. It is the ratio of actual water vapor in the atmosphere compared to the amount of water vapor that would saturate the atmosphere at that temperature. When the relative humidity is 40 percent, it means that the atmosphere contains 40 percent of the moisture that it could contain at that same temperature.

Relative humidity has a HUGE impact on fire behavior

Relative Humidity

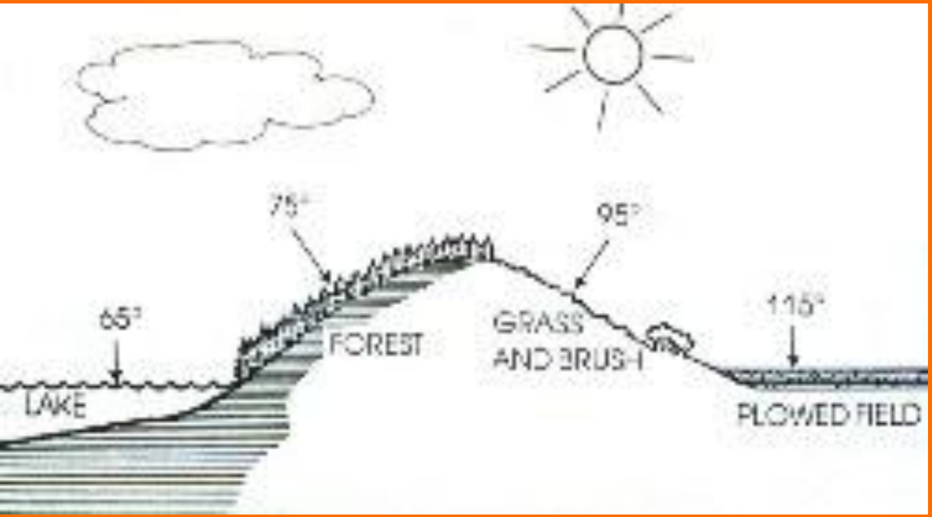
- Relative humidity fluctuates widely during each 24-hour period. It will generally be the highest in the early morning hours before daylight and the lowest during the early afternoon. This is because relative humidity is changed by temperature. When air is warmed, it expands and as a result, will hold more moisture.

“**Rule of Thumb:** Relative Humidity doubles with each 20° drop in temperature – and halves with each 20° increase in temperature.”

Precipitation

- Precipitation (rain or snow) has a direct and immediate effect on fuel moisture and relative humidity. Temperature usually drops as well and the winds become calm. When the atmosphere becomes saturated, precipitation usually occurs if more moisture is added. Precipitation will quickly dampen the surface of fuels to the point that fires cannot ignite and no wildfires will occur.

Temperature



- Air temperature has a direct influence on fire behavior because of the heat requirements for ignition and continuing the combustion process.

During the day, air that is over land becomes warmer, causing it to expand and rise.

True!

Temperature

- Radiation from the sun is at its maximum when the sun is directly overhead. Because of a delay in its effect, the peak of the burning period is generally around 1:00 to 2:00 in the afternoon.

Its cold up there!

Air Temperature generally decreases with elevation.

Atmospheric stability

- Atmospheric stability is the resistance of the atmosphere to vertical motion. If the atmosphere is unstable, vertical movement of air is encouraged and this tends to increase fire activity. If the atmosphere is stable, vertical movement of air is discouraged and this decreases fire activity.

Stable vs Unstable Conditions

Stable

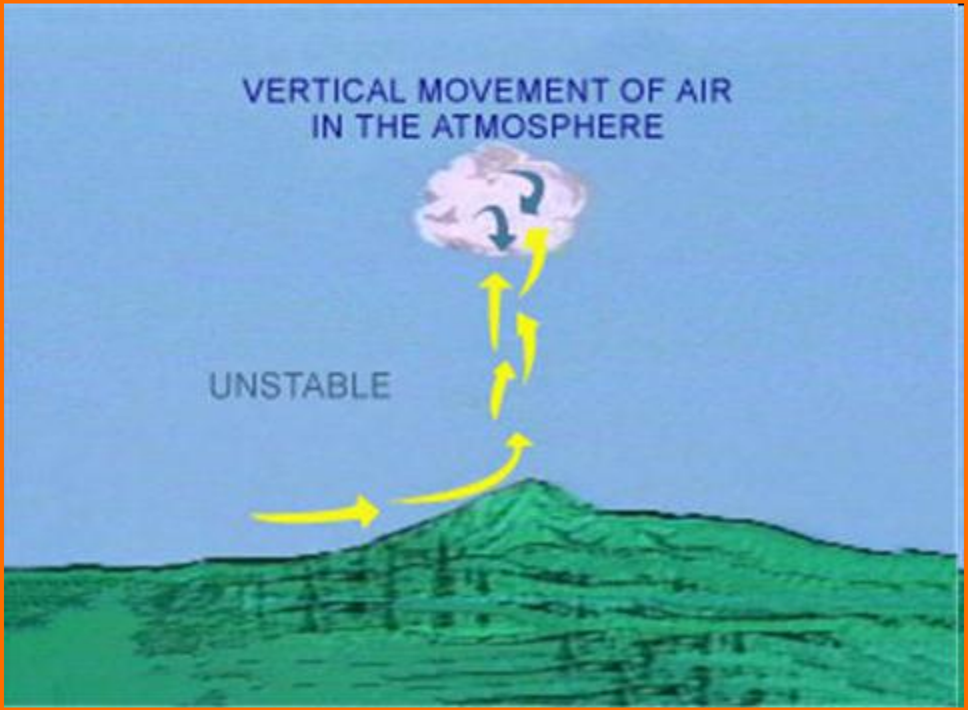
- Clouds in layers
- Stratus type clouds
- Low clouds
- Poor visibility
- Steady winds
- Fog
- Limited rise on smoke plumes

Unstable

- Clouds growing vertically
- Little or no clouds
- Cumulus type clouds
- Smoke lifting high
- Gusty winds
- Good visibility
- Dust devils

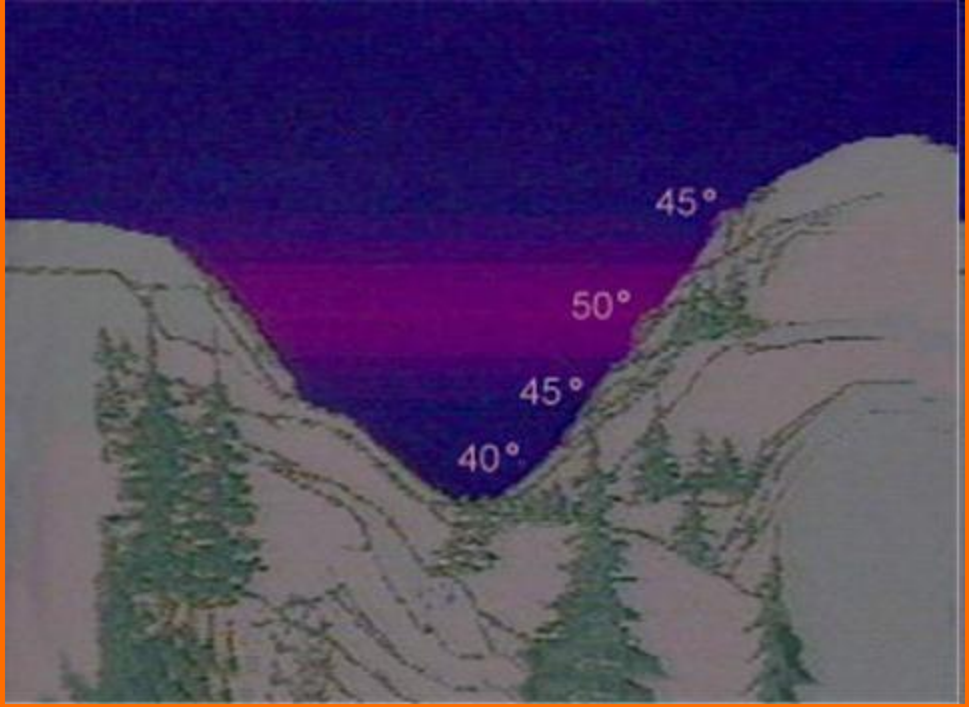
Atmospheric stability

- More unstable conditions result in more vertical movement in the atmosphere. Such conditions act like opening the damper on a stove. A fire will burn more intensely because of the unrestricted updraft of the atmosphere and convective currents. Under stable conditions, fires will burn slowly and the smoke column will not rise very far.



A smoke column that goes up and then flattens out is an indicator of a unstable air mass?

FALSE!!



Stable with inversion, temperature rises with altitude

This illustration gives four temperature readings taken at different locations on a slope. Elevations are not given, but we can see that there is a plus lapse rate below midslope and a minus lapse rate above midslope. From this we can conclude that an inversion exists at the 50 level. The air in the canyon below that level is very stable.

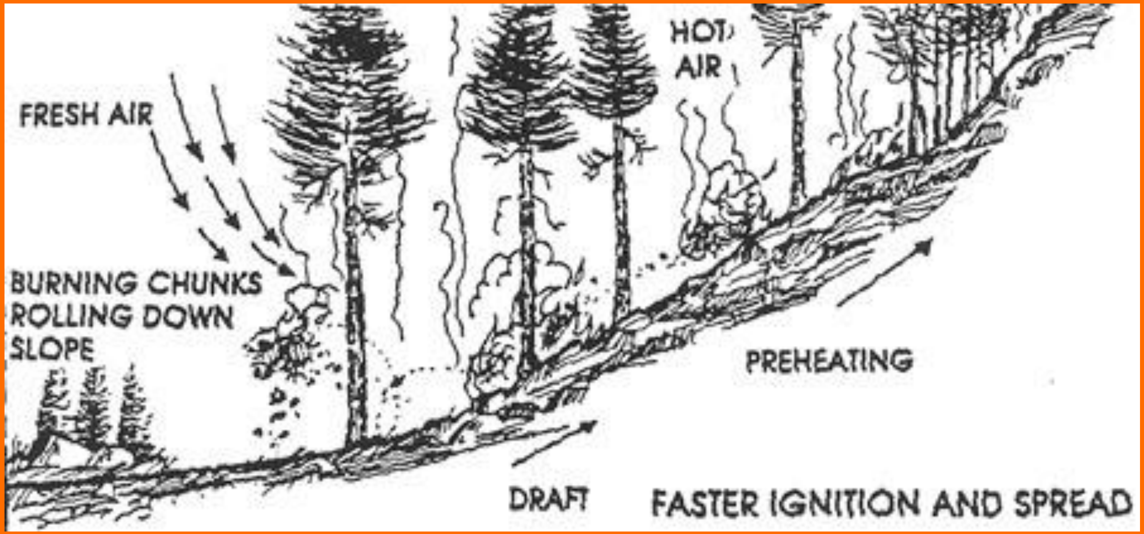
An example of a temperature inversion would be:

A layer of warm air above a layer of cold air.

Topography

- **Slope**
- **Shape of Country**
- **Aspect**
- **Barriers**

Slope

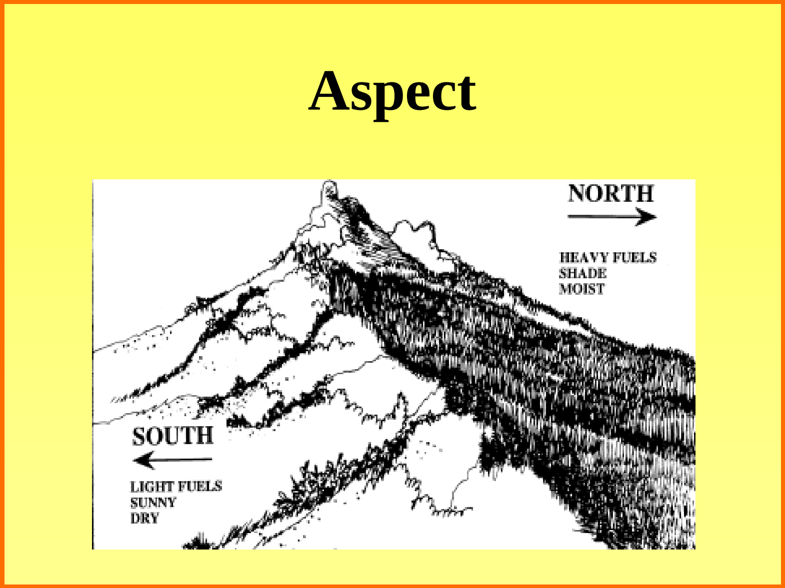


- Slope affects the spread of fire in two ways:

1. Preheating (convection & radiation)
2. Draft

Aspect

- Aspect is the direction that a slope faces. The direction a slope faces determines how much radiated heat it will receive from the sun.



SHAPE OF COUNTRY

The direction and speed of the wind can be greatly affected by topography

- Ridges and mountains
- Ravines and gullies
- Saddles and gaps

Mountains Cause Channeling of Wind

BARRIERS

- Barriers are anything (natural or man-made) that can stop or slow down the spread of fire. Examples are: fields, roads, streams, lakes, swamps (if wet) rocky outcrops, and old burns. They should be considered in planning a prescribed burn or in control of a wildfire. They can also be barriers to equipment.

Mowed fire break

Old Stage Road Fire

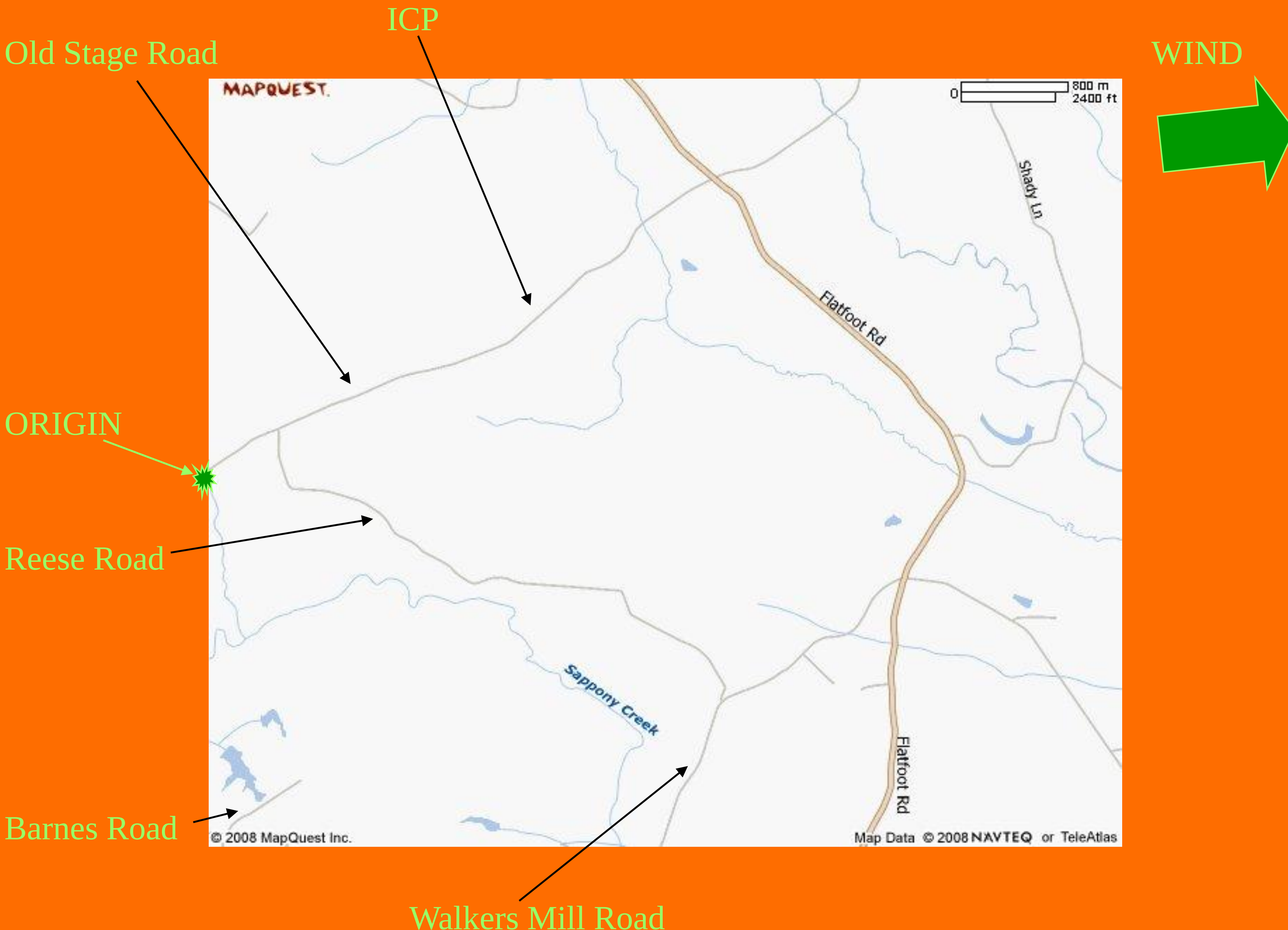
Dinwiddie County

February 10-13, 2008

February 10, 2008 Weather

- Temperature: 60°
- Humidity: 4%
- Wind: West @ 36mph G50+
- Days since rain: 8
  - Amount of rain: 1.0”

+ unstable atmosphere


ICP
Old Stage Road
WIND
ORIGIN
Reese Road
Barnes Road
Walkers Mill Road
MAPQUEST.
0
800 m
2400 ft
Shady Ln
Flatfoot Rd
Sappony Creek
Flatfoot Rd
© 2008 MapQuest Inc.
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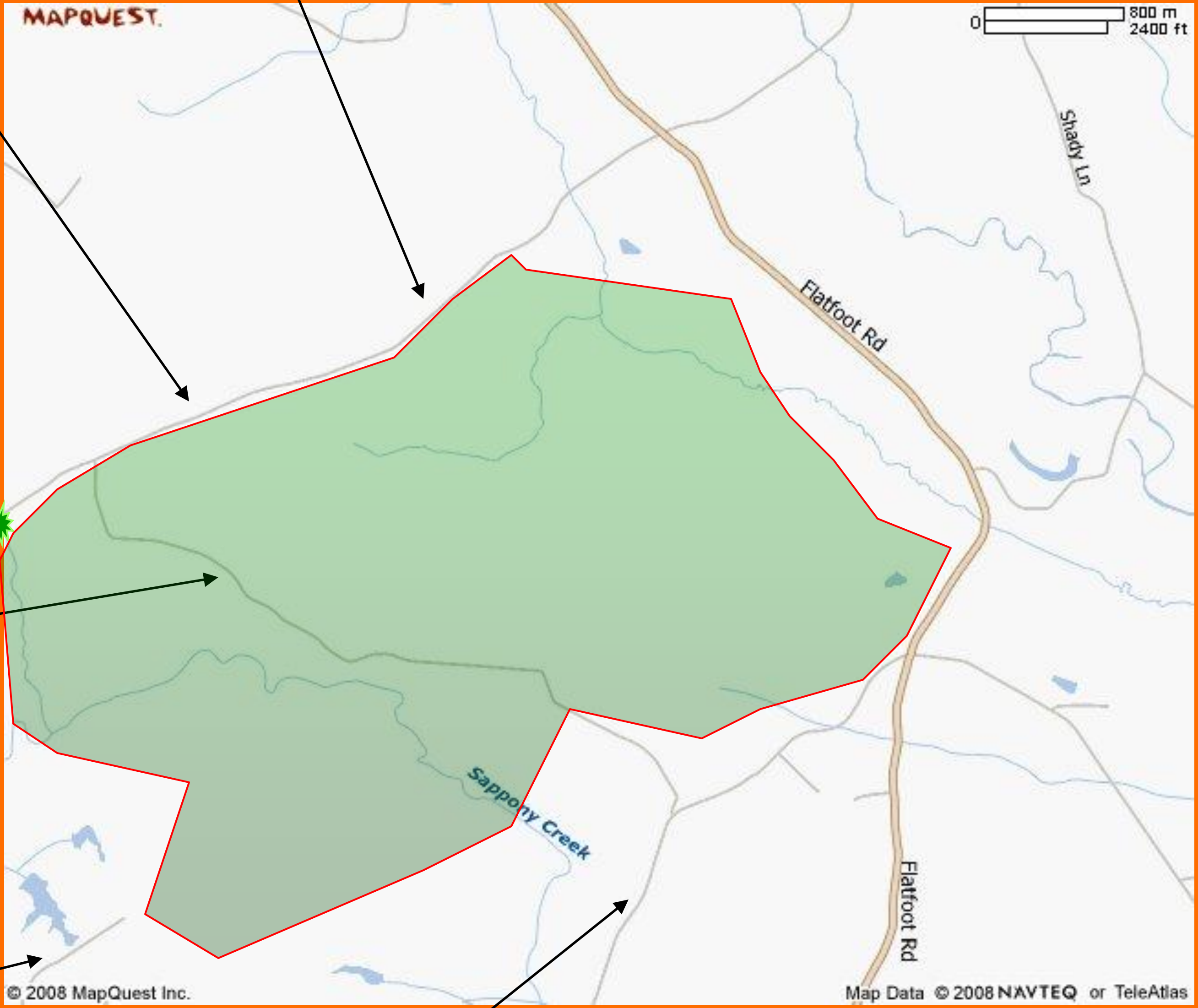
ICP

Old Stage Road

WIND



ORIGIN

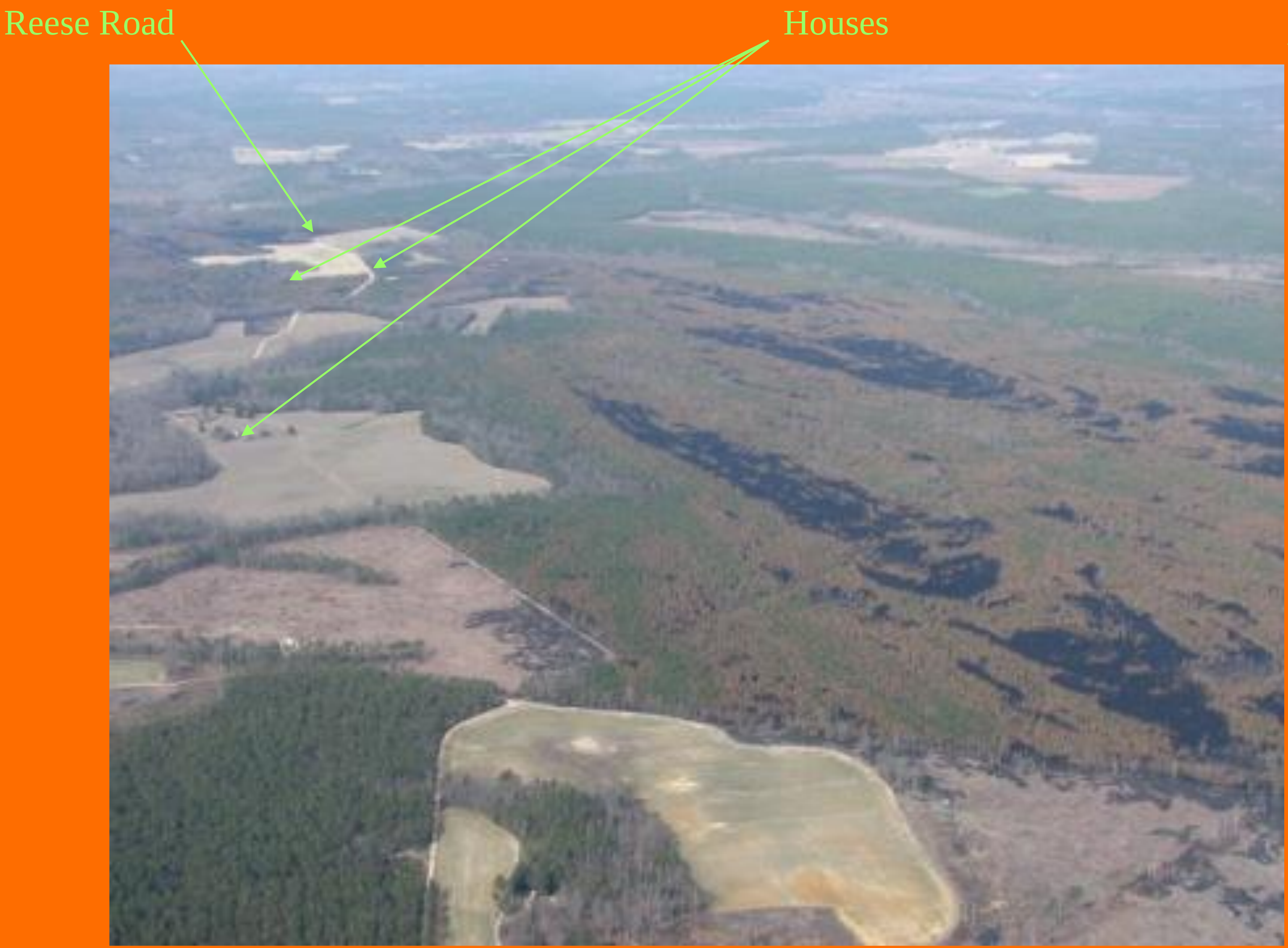
Reese Road

Barnes Road

Walkers Mill Road



Reese Rd


Reese Road
Houses

House
1-year old
cutover

Summary

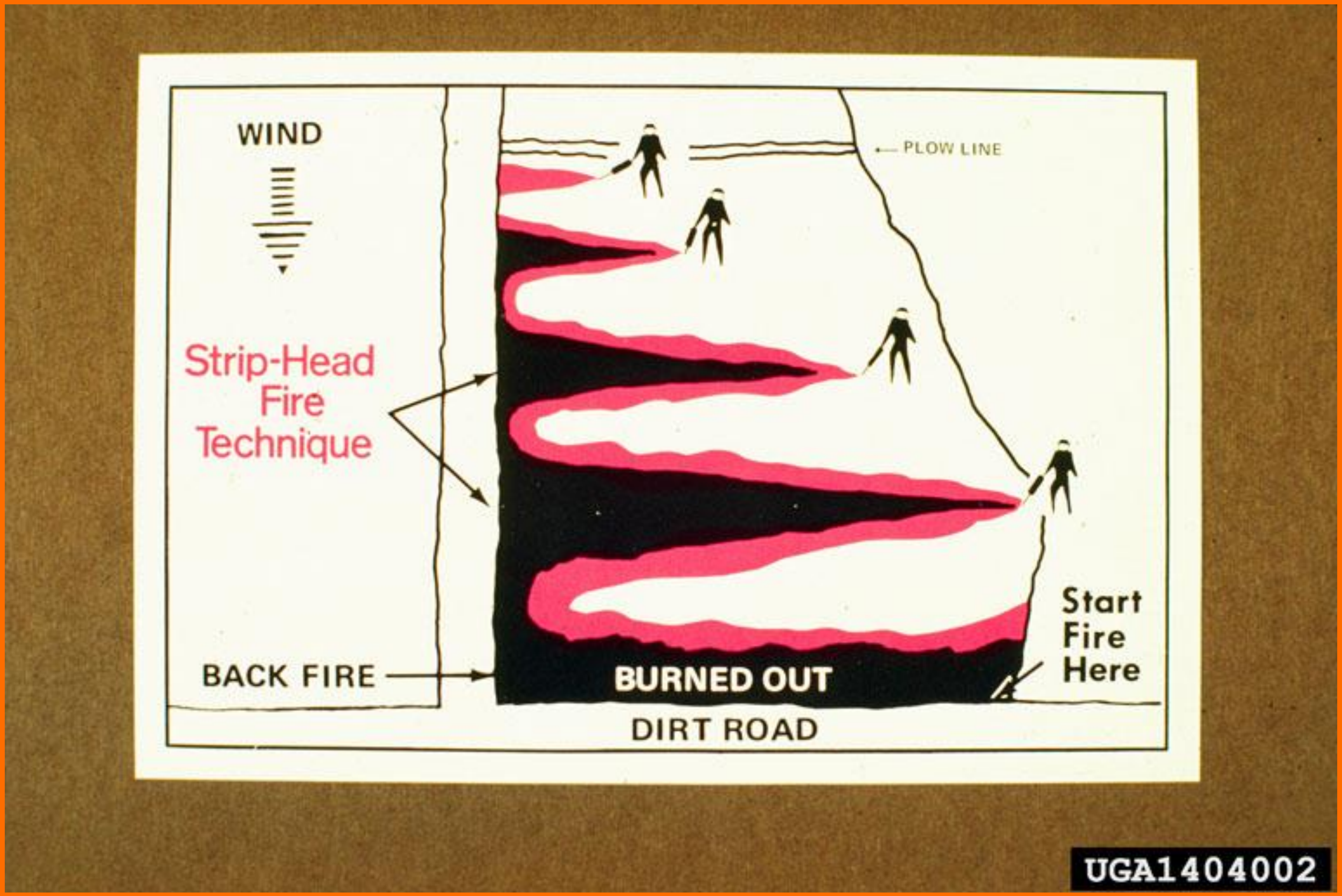
- Acres Burned: 2850
- Structures Protected: 7 homes, 3 out buildings
- Injuries: 1 (smoke inhalation-volunteer)
- Volunteer Hours: 250+
- DOF Hours: 260+
- Timber Damage: +/- $750,000
- Size:
  - 5 miles at longest point
  - 3 miles at widest point

Four factors that are responsible for the occurrence of extreme fire behavior are:

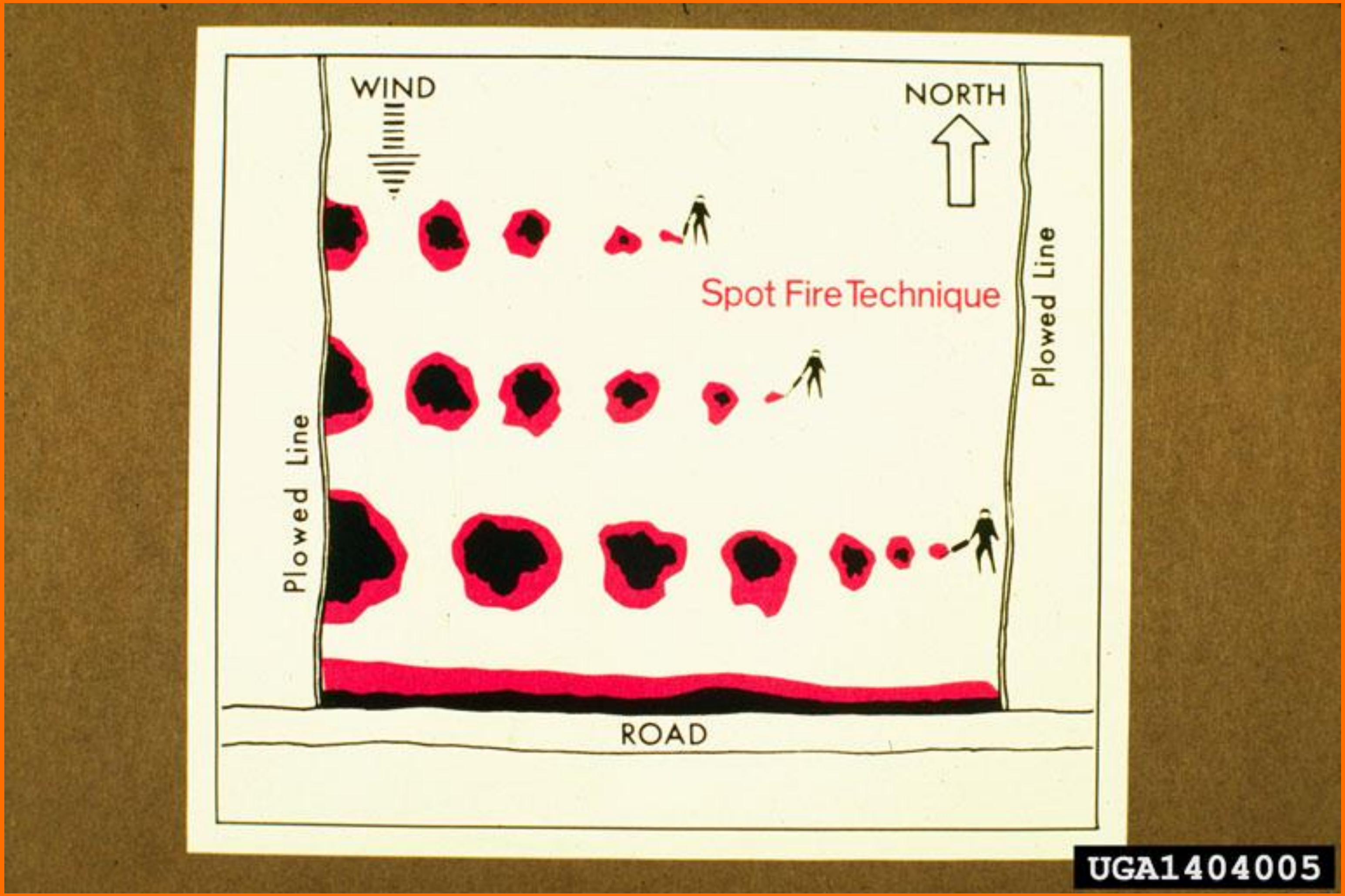
1. **Low fuel moisture,**
2. **high wind,**
3. **low atmospheric moisture,**
4. **atmospheric instability**

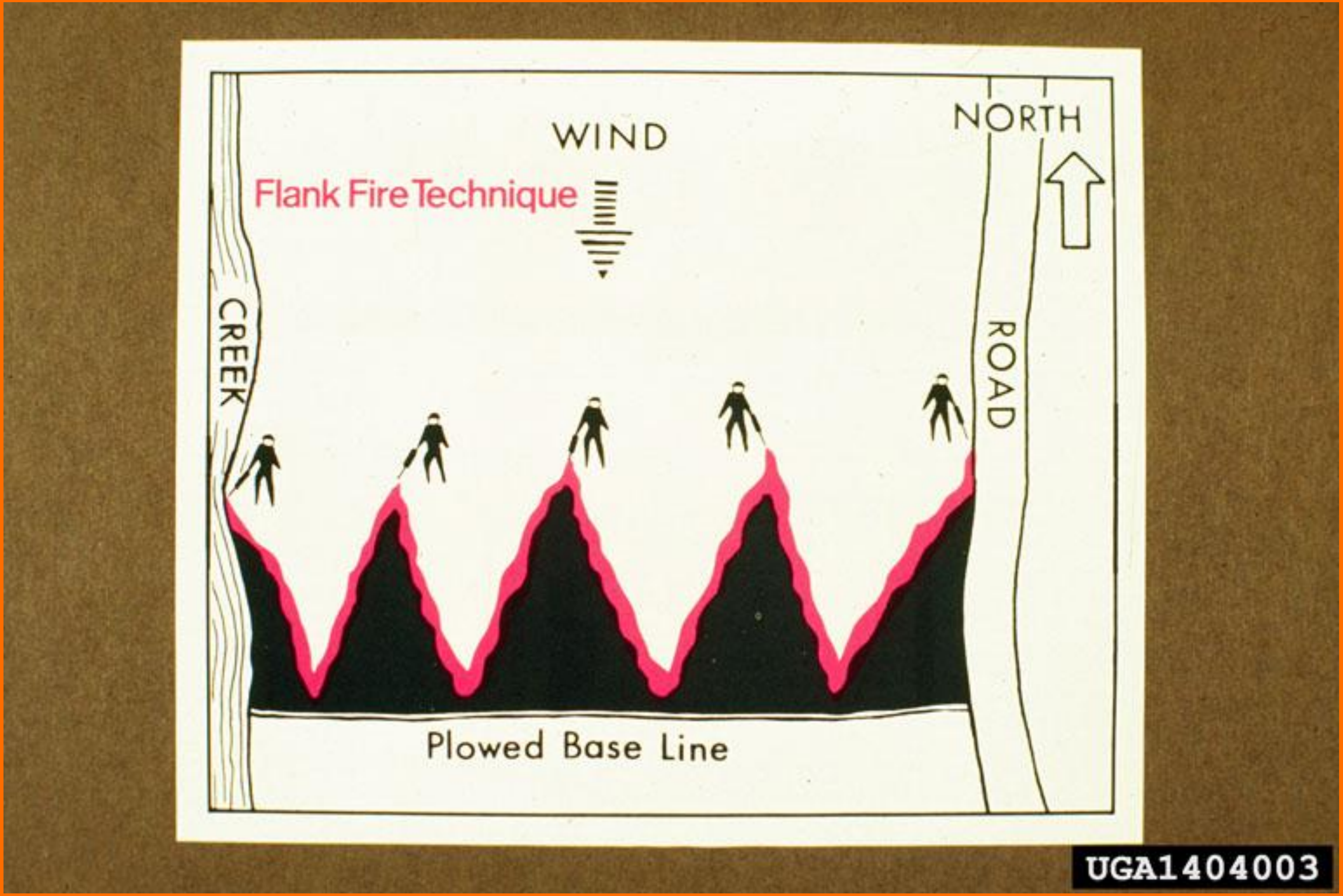
Ignition Patterns

- Backing Fire
- Strip Head Fire
- Flanking Fire

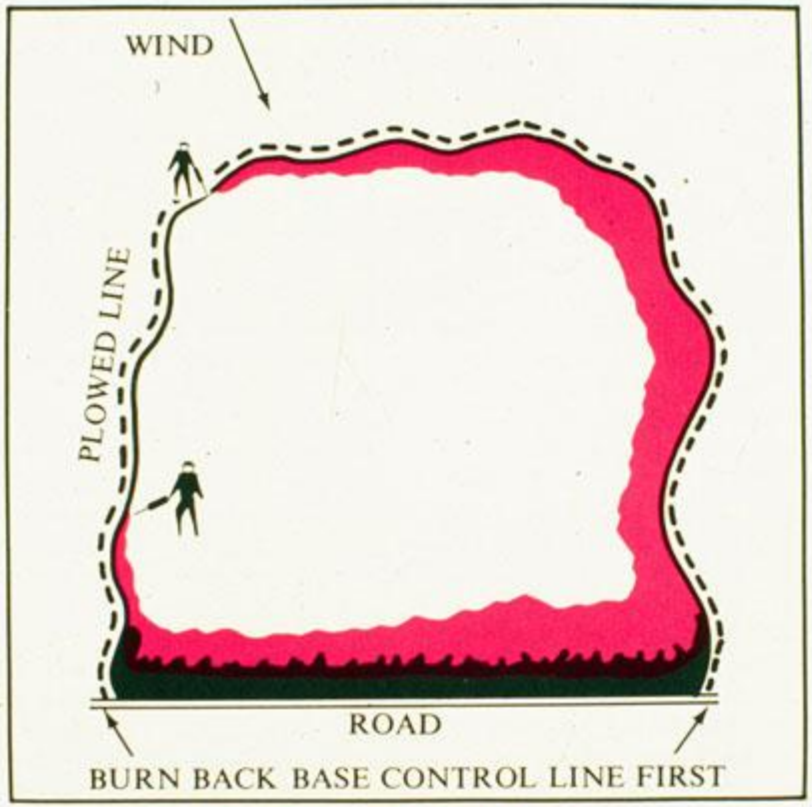


WIND
PLOW LINE
Strip-Head Fire Technique
BACK FIRE
BURNED OUT
Start Fire Here
DIRT ROAD
UGA1404002


WIND
NORTH
Spot Fire Technique
Plowed Line
Plowed Line
ROAD
UGA1404005



Flank Fire Technique
WIND
NORTH
CREEK
ROAD
Plowed Base Line
UGA1404003



Ring Fire Technique

UGA1404006

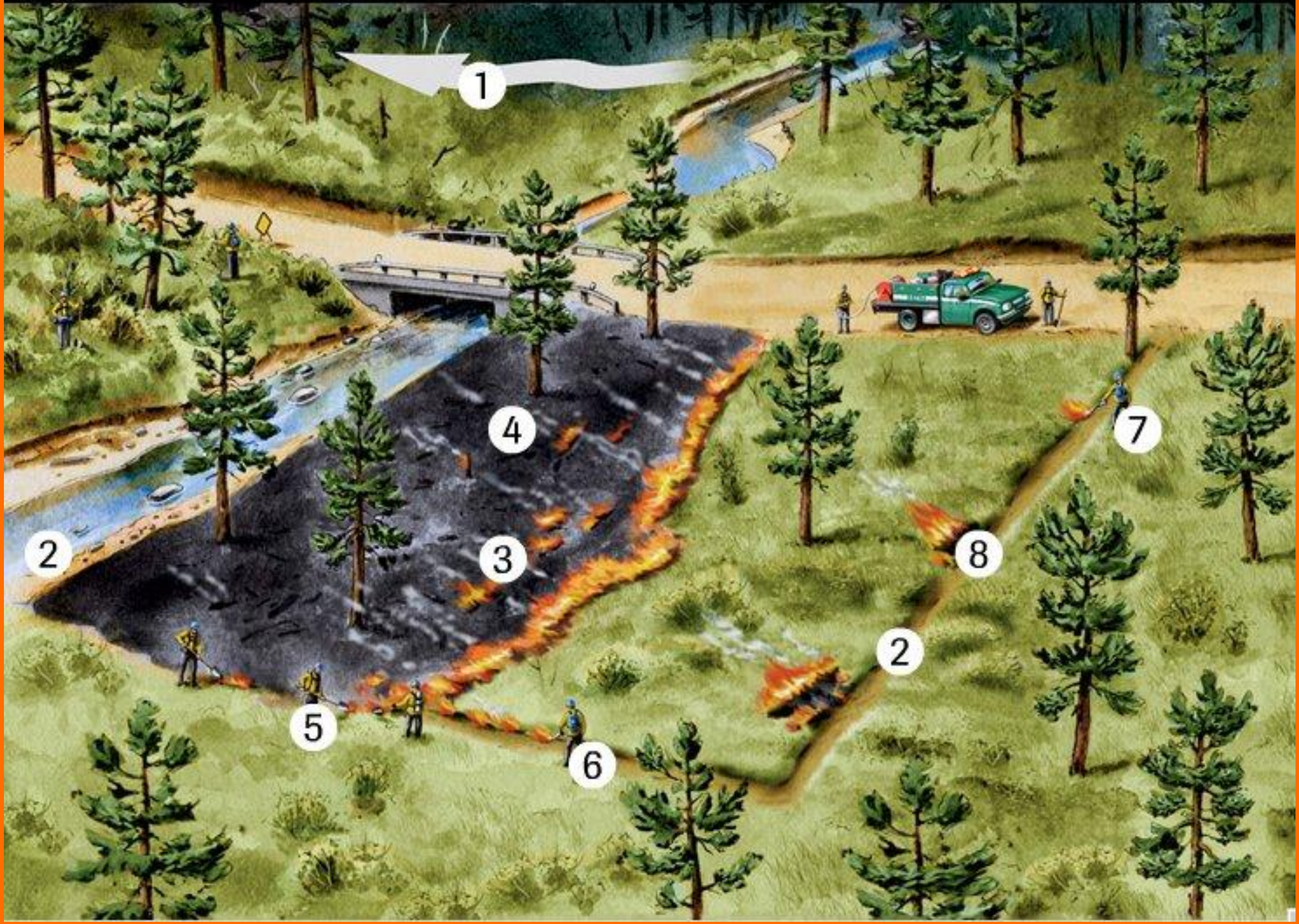
Backing Fire

Strip Head Fire

Flanking Fire

The ABCs of a Controlled Burn

A burn boss's first priority is to conduct a safe burn, which requires long hours of preparation. Follow the steps below.



Helpful Tools

- Online class
- FEIS
- Fire Prediction Systems
- Internet weather
- Sling psychomotor

Course
Wildland Fire Management and Planning Home
About the Professor
Schedule
Field Guide
Vocabulary

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WILD4520 - Wildland Fire Management and Planning, Spring 2004

— filed under: management, wildland, fire, snow, environment, models, range, planning, dynamics, resources

Image courtesy of Jodene Eikenberry

FRWS 4520

Professor Michael Jenkins, Ph.D.

Wildland Resources
Utah State University

Course Structure: Online

Prerequisites: None

Course Description

You will be introduced to the most important variables that affect fire behavior. You will see how the interactions of fire with its environment must influence our assessments of fire behavior. This course will also introduce you to mathematical fire models available to help us predict fire behavior.

Technical Requirements

Macromedia Flash Player

Schedule

Unit	Introduction and Objectives	Workbook	Study Guide		Exercises
1	The Fire Environment	HTML	PDF	HTML	Ex. 1
2	Fuels Classification	HTML	PDF	HTML	Ex. 2
3	Topography and Fire Behavior	HTML	PDF	HTML	Ex. 3
4	Temperature-Moisture Relationship	HTML	PDF	HTML	Ex. 4
5	Fuel Moisture [redacted]	HTML	PDF	HTML	Ex. 5
6	Local and General Winds [redacted]	HTML	PDF	HTML	Ex. 6
7	Atmospheric Stability and Instability [redacted]	HTML	PDF	HTML	Ex. 7
8	Keeping Current with the Weather	HTML	PDF	HTML	Ex. 8
9	Extreme Fire Behavior [redacted]	HTML	PDF	HTML	Ex. 9
10	Fire Behavior Affects Fireline Tactics	HTML	PDF	HTML	Ex.10
11	Fire Behavior Prediction Systems [redacted]	HTML	PDF	HTML	Ex.11

[redacted]

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http://www.fs.fed.us/database/feis/

Species: Lonicera japonica | Add Tab

FIRE EFFECTS

SPECIES: Lonicera japonica

- IMMEDIATE FIRE EFFECT ON PLANT
- DISCUSSION AND QUALIFICATION OF FIRE EFFECT
- PLANT RESPONSE TO FIRE
- DISCUSSION AND QUALIFICATION OF PLANT RESPONSE
- FIRE MANAGEMENT CONSIDERATIONS

IMMEDIATE FIRE EFFECT ON PLANT:
Japanese honeysuckle is top-killed by fire [3,11,33]. There are no published accounts of fire destroying entire plants.

Climbing Japanese honeysuckle can become ladder fuels. Fire may reach 15 feet (4.5 m) or more into the canopy on Japanese honeysuckle vines [1].

DISCUSSION AND QUALIFICATION OF FIRE EFFECT:
Damage to Japanese honeysuckle may be increased by fires coinciding with bud burst [3].

PLANT RESPONSE TO FIRE:
Japanese honeysuckle sprouts after damage from fire [1,3,11,26,33]. Specific information about postfire regeneration is lacking, but published sources indicate that in general, Japanese honeysuckle sprouts from root crowns and roots from trailing stems [40,47,70,70].

DISCUSSION AND QUALIFICATION OF PLANT RESPONSE:
While Japanese honeysuckle is top-killed by fire, postfire sprouting can lead to rapid recovery of preexisting colonies [128]. As of this writing (2002), published accounts of postfire recovery rates are lacking. However, it appears likely that postfire recovery may lead to Japanese honeysuckle levels that surpass prefire cover or biomass. Both fall and winter burns in northwestern Georgia significantly ($P < 0.05$) reduced Japanese honeysuckle biomass. However, sprouting from buds protected by unburned litter was evident as soon as 1 month following fire [33]. Despite considerable top-kill, postfire sprouting following 2 consecutive annual spring burns in a North Carolina shortleaf pine forest resulted in Japanese honeysuckle maintaining "its dominant status as a ground cover" [11]. Prescribed burning in the South Carolina Piedmont resulted in vigorous growth of Japanese honeysuckle, which had previously been "suppressed by litter" [26].

Fire Behavior Prediction

- Rothermal's model of fire spread

Fire Behavior Prediction System - makes fire behavior predictions based on user-defined fuel models and weather parameters. Calculated with tables, nomograms, and PC.

- Fuel Model - a list of numbers that characterize the thermophysical and thermochemical properties of a given fuel type.
  - 13 fuel models that represent grass, shrub, timber litter, and slash fuels.
- Behave

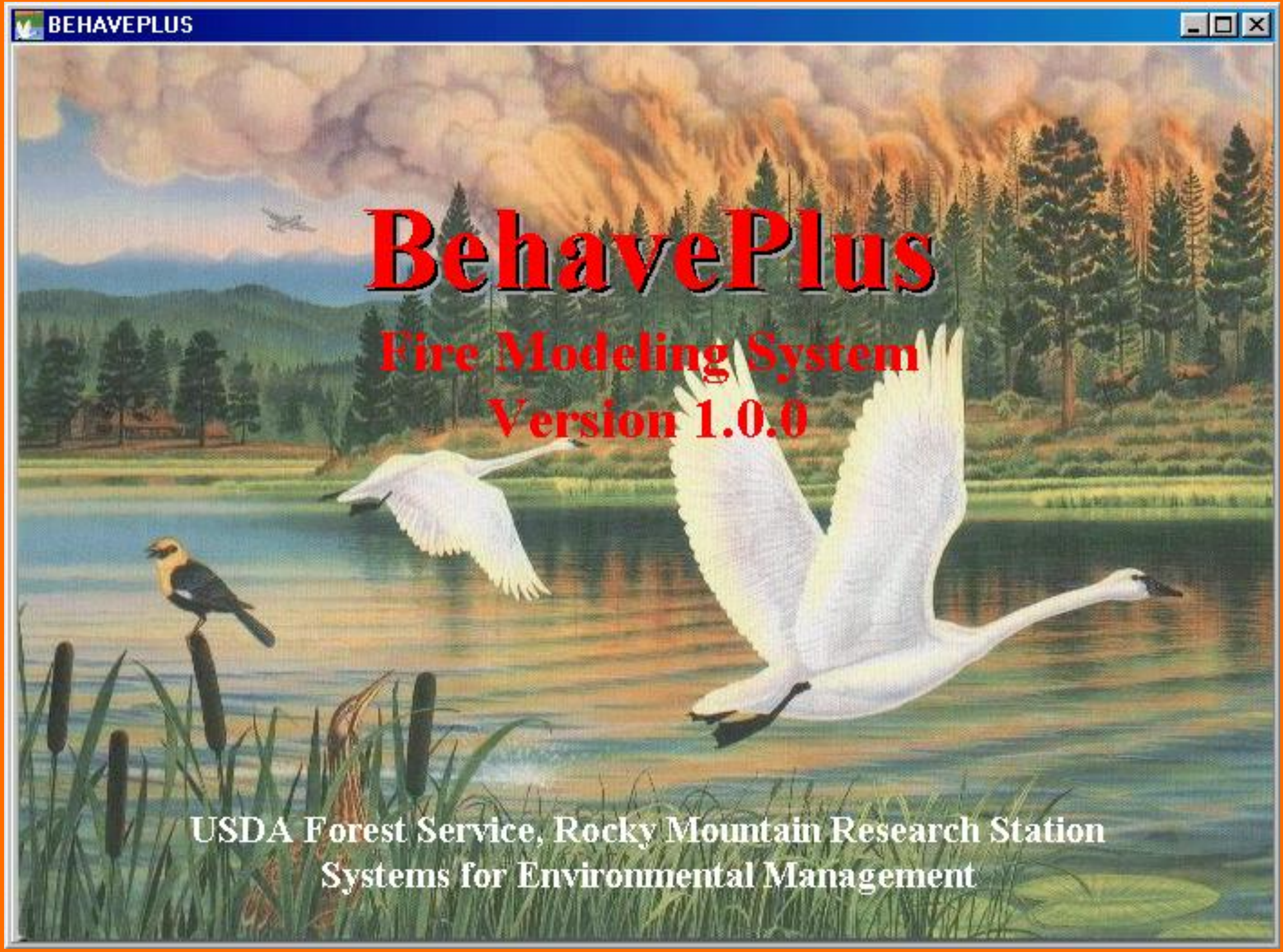
Fuel Models

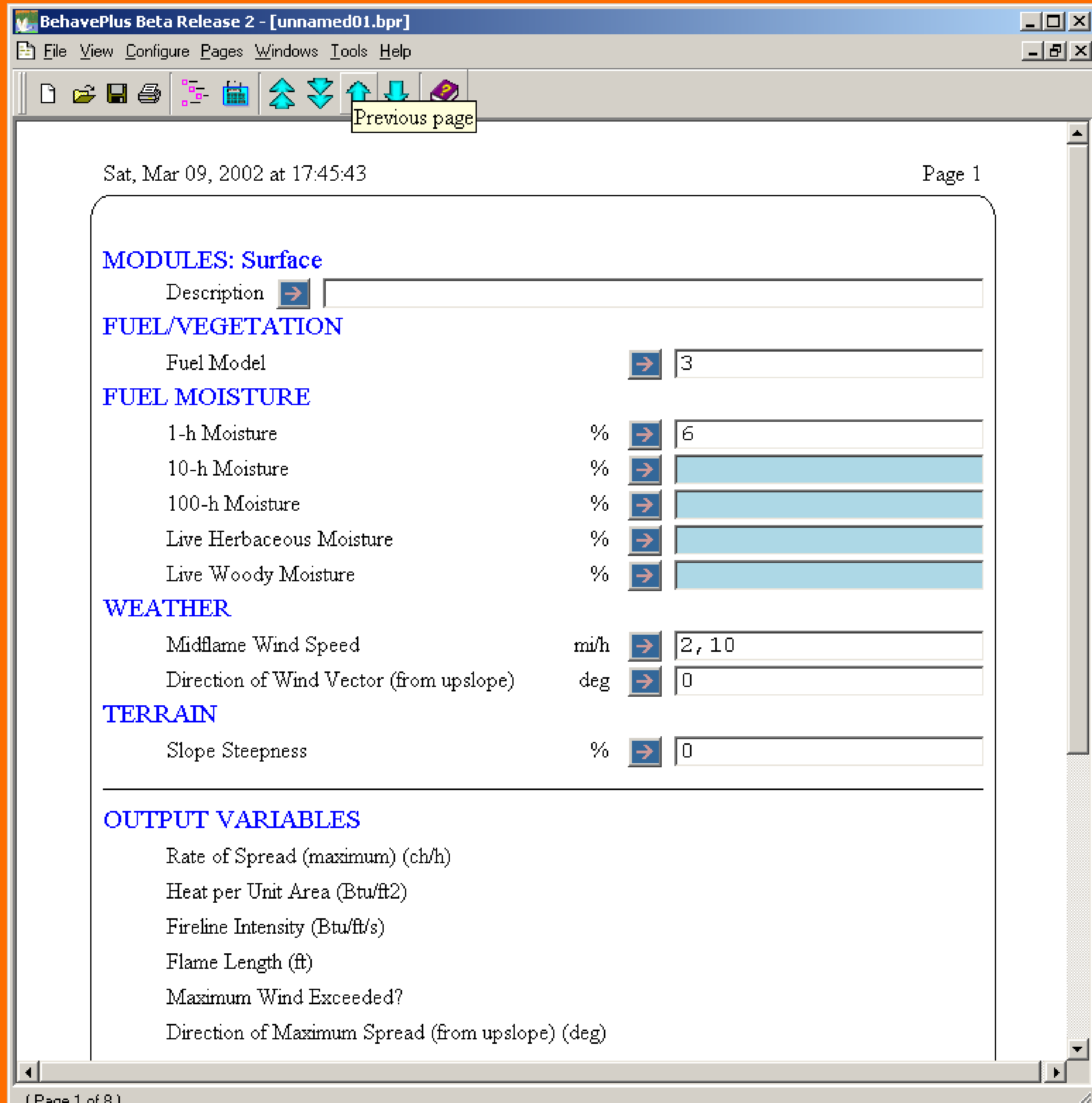
Table 1.— Description of fuel models used in fire behavior as documented by Albini (1976)

Fuel model	Typical fuel complex	Fuel loading				Fuel bed depth	Moisture of extinction dead fuels
		1 hour	10 hours	100 hours	Live		
		Tons/acre				Feet	Percent
	Grass and grass-dominated						
1	Short grass (1 foot)	0.74	0.00	0.00	0.00	1.0	12
2	Timber (grass and understory)	2.00	1.00	.50	.50	1.0	15
3	Tall grass (2.5 feet)	3.01	.00	.00	.00	2.5	25
	Chaparral and shrub fields						
4	Chaparral (6 feet)	5.01	4.01	2.00	5.01	6.0	20
5	Brush (2 feet)	1.00	.50	.00	2.00	2.0	20
6	Dormant brush, hardwood slash	1.50	2.50	2.00	.00	2.5	25
7	Southern rough	1.13	1.87	1.50	.37	2.5	40
	Timber litter						
8	Closed timber litter	1.50	1.00	2.50	0.00	0.2	30
9	Hardwood litter	2.92	.41	.15	.00	.2	25
10	Timber (litter and understory)	3.01	2.00	5.01	2.00	1.0	25
	Slash						
11	Light logging slash	1.50	4.51	5.51	0.00	1.0	15
12	Medium logging slash	4.01	14.03	16.53	.00	2.3	20
13	Heavy logging slash	7.01	23.04	28.05	.00	3.0	25

Fuel Models 1, 3, and 9

Fire Behavior Prediction

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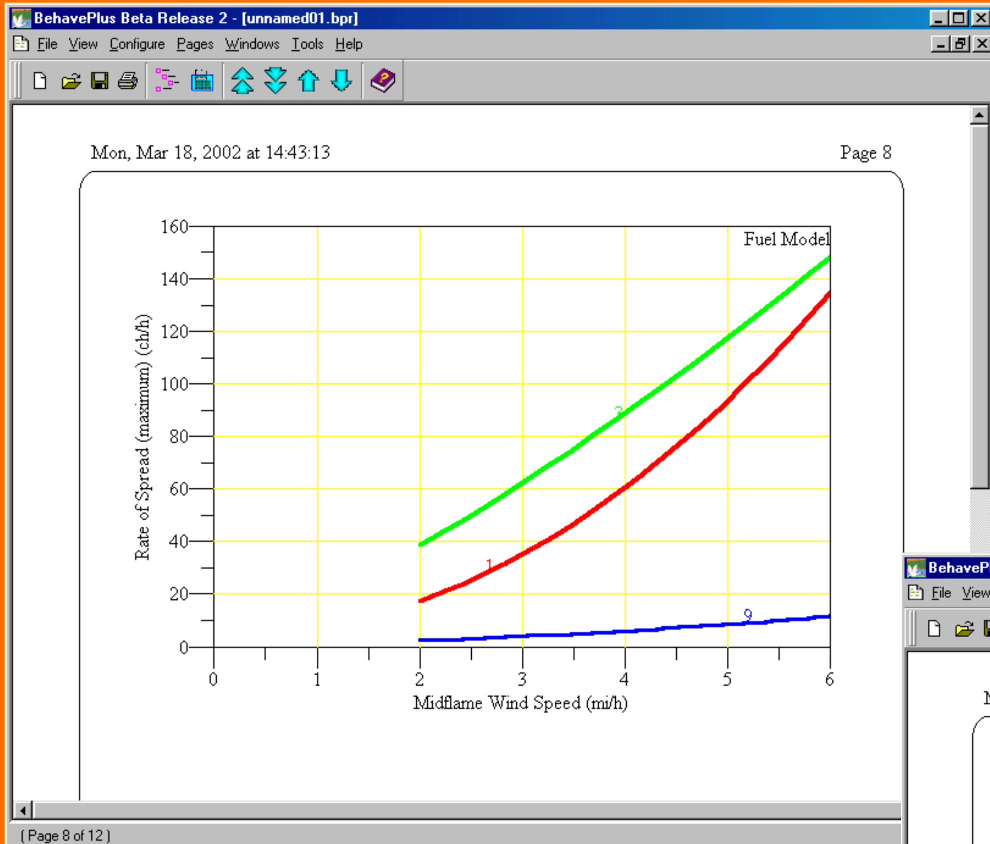
File View Configure Pages Windows Tools Help
Previous page
Sat, Mar 09, 2002 at 17:45:43
Page 1
MODULES: Surface
Description
FUEL/VEGETATION
Fuel Model
3
FUEL MOISTURE
1-h Moisture
%
6
10-h Moisture
%
100-h Moisture
%
Live Herbaceous Moisture
%
Live Woody Moisture
%
WEATHER
Midflame Wind Speed
mi/h
2, 10
Direction of Wind Vector (from upslope)
deg
0
TERRAIN
Slope Steepness
%
0
OUTPUT VARIABLES
Rate of Spread (maximum) (ch/h)
Heat per Unit Area (Btu/ft2)
Fireline Intensity (Btu/ft/s)
Flame Length (ft)
Maximum Wind Exceeded?
Direction of Maximum Spread (from upslope) (deg)
(Page 1 of 8)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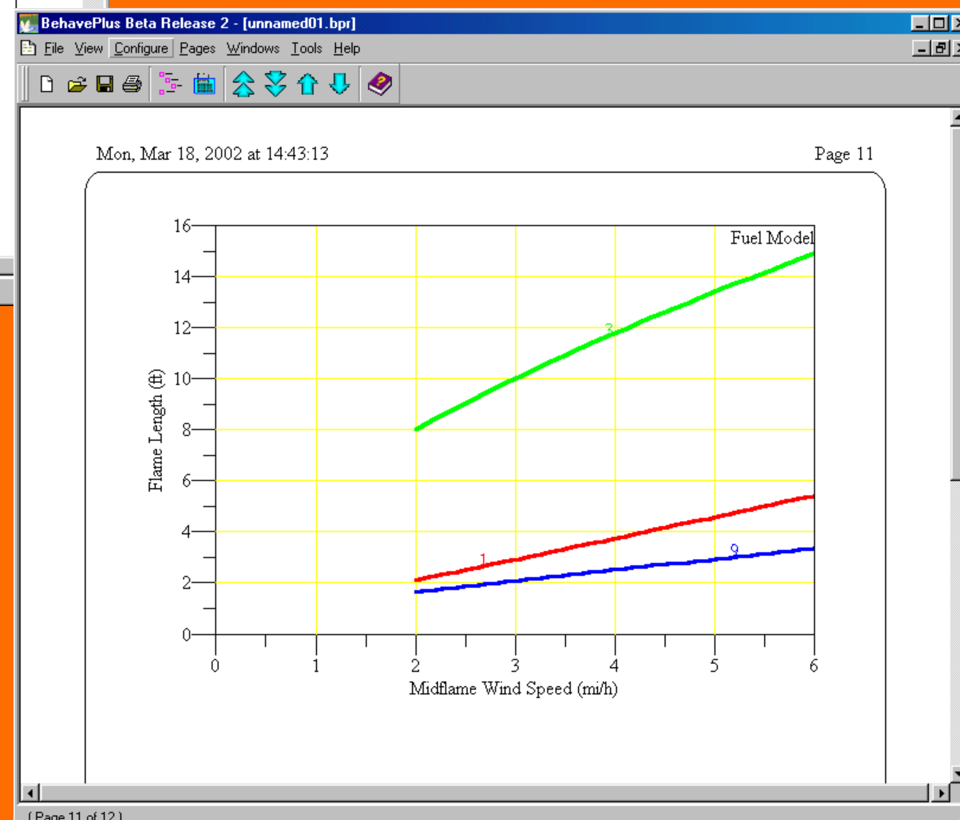
Page 8
Fuel Model
Rate of Spread (maximum) (ch/h)
Midflame Wind Speed (mi/h)
(Page 8 of 12)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File View Configure Pages Windows Tools Help
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Page 11
Fuel Model
Flame Length (ft)
Midflame Wind Speed (mi/h)
(Page 11 of 12)

Real-Time Fire Weather Information from NWS Wakefield VA

WAKEFIELD

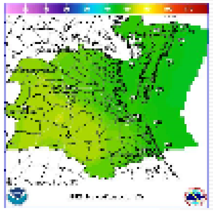
2007 Annual Operations Plan for VA

2007 Annual Operations Plan Lower Maryland Eastern Shore

2007 Annual Operations Plan for North Carolina

An Introduction to the Fire Weather Forecast

Relative
Reference
Moisture
Dead Fuel



WAKEFIELD SPECIFIC PRODUCTS
NWS Wakefield Fire Weather Forecast
Request SPOT Forecast
Fire Weather Watches and Warnings
Digital "AREA" Forecast
Digital "POINT" Forecast

ISLE OF WIGHT-SUFFOLK-CHESAPEAKE-

430 AM EST WED JAN 19 2011

	TODAY	TONIGHT	THU
CLOUD COVER	PCLDY	MCLEAR	PCLDY
PRECIP TYPE	SHOWERS	NONE	NONE
CHANCE PRECIP (%)	20	0	10
MAX/MIN TEMP	55	30	44
MAX/MIN RH (%)	55	80	49
WND20FT2MIN/EARLY(MPH)	W 4-8	LGT/VAR	LGT/VAR
WND20FT2MIN/LATE(MPH)	W 5-9	LGT/VAR	LGT/VAR
PRECIP AMOUNT	0.00	0.00	0.00
PRECIP DURATION	0	0	0
MAX MIXING HGT(FT-AGL)	4100		3000
TRANSPORT WIND (MPH)	W 17		SW 3
VENT RATE (FT-MPH)	69700		9000

Rating: ★★★★★
Price: $1.99
Version: 1.5
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For wildland firefighters. Obtain dry & web b
temps from your belt weather kit or weather
meter then use this app to calculate:

- Probability of Ignition (PIG)
- Relative Humidity (RH)
- Reference Fuel Moisture (RFM)
- Fuel Moisture Corrections (FMC)
- Fine Dead Fuel Moisture (FDFM)
- Dew Point (DP)

ound tab while

+ Text Message Your Results
+ Uses GPS Elevation
+ Perfect For The Wildland Firefighter

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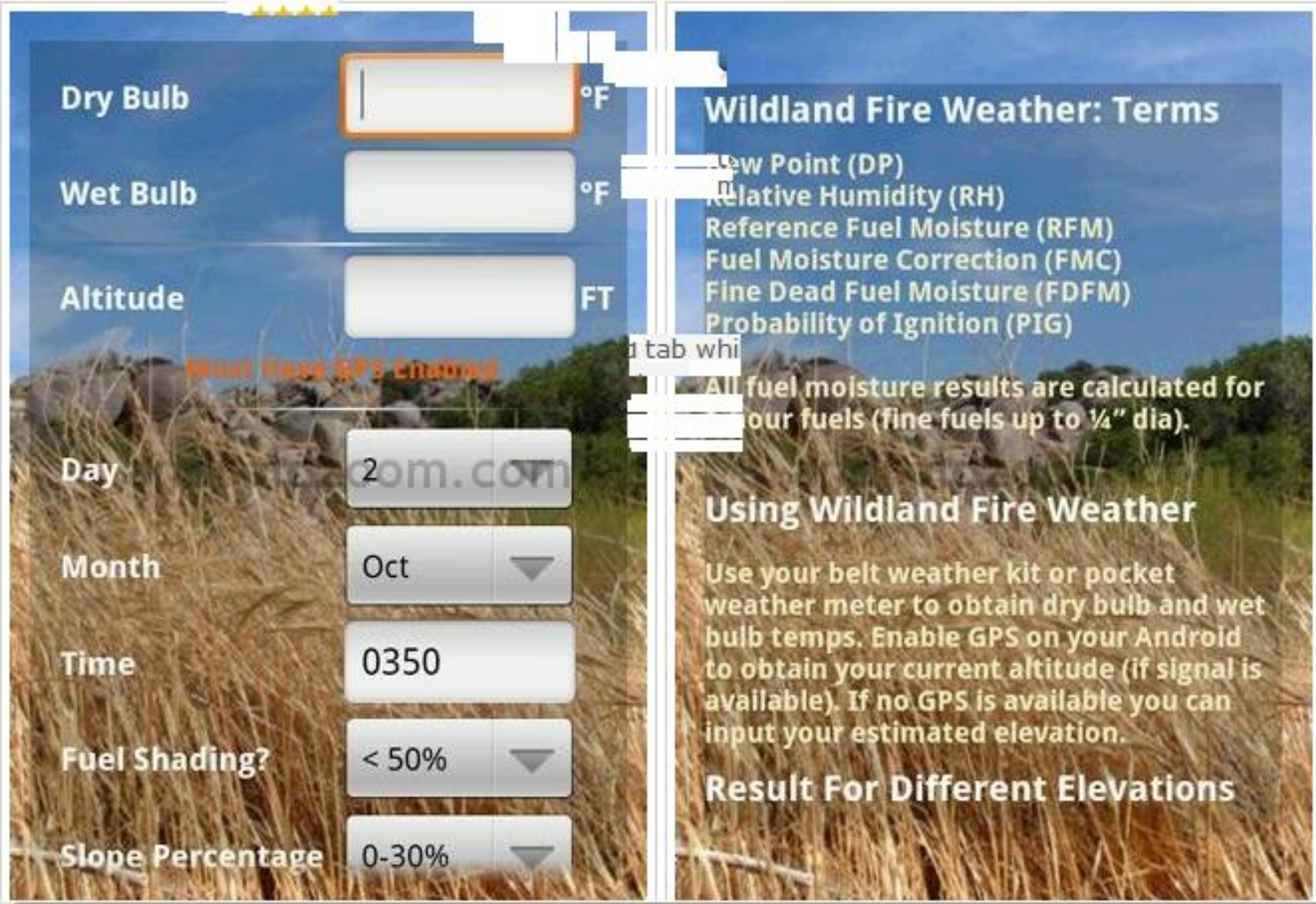
applications, wildland fire weather + andro

Wildland Fire Weather Screenshots



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Summary - Topics of Discussion

- Definitions and Fire triangles
- Fire weather
- Fuels
- Topography
- Helpful tools (FEIS, Fire prediction systems)